PB83-136408

Solid Waste Management Plan
Millard County, Utah
A Technical Assistance Panels Program Report

Fred C. Hart Associates, Inc.
Denver, CO

Prepared for

Environmental Protection Agency
Denver, CO

Aug 82

U.S. Department of Commerce
National Technical Information Service
NTIS

United States
Environmental Protection
Agency

Region VIII
1860 Lincoln Street
Denver, Colorado 80295

PB83-136408

Solid Waste

EPA 908/6-82-008

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SOLID WASTE MANAGEMENT PLAN: MILLARD COUNTY, UTAH

A TECHNICAL ASSISTANCE PANELS PROGRAM REPORT

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TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

1. REPORT NO.
908/6-82-008

2.

3. RECIPIENT'S ACCESSION NO.
PB83 136408

4. TITLE AND SUBTITLE
Solid Waste Management Plan: Millard County, Utah -
A Technical Assistance Panels Program Report

5. REPORT DATE
August, 1982

6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)
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8. PERFORMING ORGANIZATION REPORT NO.

9. PERFORMING ORGANIZATION NAME AND ADDRESS
Fred C. Hart Associates, Inc.
1320 17th Street
Denver, Colorado 80202

10. PROGRAM ELEMENT NO.
68-01-6008

11. CONTRACT/GRANT NO.

12. SPONSORING AGENCY NAME AND ADDRESS
U.S. Environmental Protection Agency, Region VIII
1860 Lincoln Street
Denver, Colorado 80203

13. TYPE OF REPORT AND PERIOD COVERED
Final

14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

Millard County, Utah is expected to experience a 60 to 140 % increase in population by 1987 due to the construction of a 3,000 MW coal-fired power plant and impacts of the proposed MX missile system. The rural, agricultural County lacks an organized solid waste collection and disposal system and has a large number of uncontrolled disposal sites. This report analyzes 5 collection and disposal options and a recommended plan is developed. All options reduce the environmental and public health and safety problems associated with the County's open dumps, establish a higher level of service for residents, and provide the flexibility required to accomodate the anticipated population growth and fluctuations. The recommended plan includes greenbox collection for compactable wastes and roll-off containers for bulky wastes. One regional sanitary landfill will receive all of the County's compactable waste as well as bulky wastes generated in the western portion of the County. A bulky waste site is recommended for the eastern portion of the County as transporting bulky wastes long distances to the regional landfill is not cost-effective. Details for closing each of the County's 14 open dump sites are provided. Staffing requirements and duties for the system are included. Capital and operational costs are developed for 5-year increments. Financing and management options available are outlined with recommendations for the optimal techniques. A solid waste ordinance which can be utilized as a model to the County is presented.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Sanitary Landfill, Solid Waste Disposal, Solid Waste Transfer Systems, Solid Waste Management Plan	Millard County, Utah	

18. DISTRIBUTION STATEMENT Released to public	**19. SECURITY CLASS** *(This Report)* Unclassified	**21. NO. OF PAGES**
	20. SECURITY CLASS *(This page)* Unclassified	**22. PRICE**

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

United States
Environmental Protection
Agency

Region VIII
1860 Lincoln Street
Denver, Colorado 80295

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EPA 908/6-82-008

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Prepared for:
U. S. Environmental Protection Agency
Region VIII
1860 Lincoln Street
Denver, Colorado 80295

Prepared by:

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1320 17th Street
Denver, Colorado 80202

August, 1982

Report No. 908/6-82-008

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MILLARD COUNTY, UTAH

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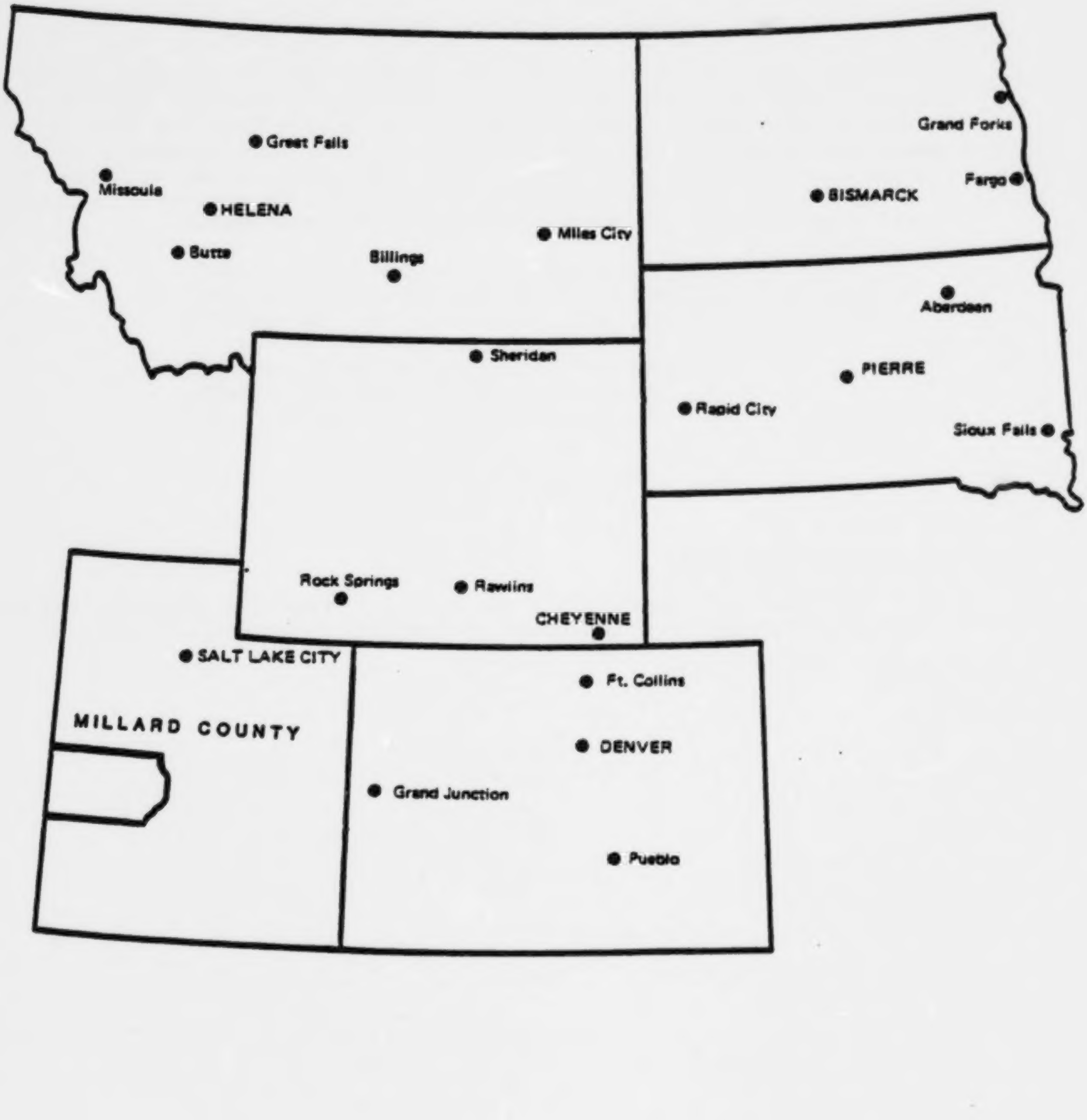
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This report has been reviewed by the Project Officer, EPA, and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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EXECUTIVE SUMMARY

Millard County and the City of Delta requested assistance from the U.S. Environmental Protection Agency to develop a solid waste management plan which would promote cost-effective and environmentally sound waste collection and disposal practices. The project addressed the specific effects on solid waste caused by a projected 60 to 140 percent total population growth by 1987, due to the Intermountain Power Project and the proposed MX missile system. Aspects of particular concern to Millard County were rapid growth, the lack of an existing organized collection and disposal system, the existence of a large number of uncontrolled disposal sites, and the presence of special wastes. In addition, the report is intended for use as a model for other rural areas experiencing "boom town" growth.

The County requested that several potential landfill sites be located. Criteria utilized in choosing sites were; the potential for adverse groundwater impacts, the potential for adverse surface water impacts, availability of cover material, area (size) of the site, land availability, zoning, impact on prime agricultural land, haul distance, access, and compatibility with city and County master plans. Topographic and land ownership maps, well data, and soil information were used to identify 19 sites. Field investigation of these sites resulted in the selection of the five most suitable sites, and two of these sites were recommended for use in the final plan.

Several collection and disposal options were analyzed, and a recommended plan was developed. Initially, cost estimates were generated for five specific options, which involved such collection methods as the use of greenboxes, transfer trailers (with compactors), and/or roll-off containers (with or without compactors). Disposal costs were determined by developing costs for one full-service landfill and one bulky waste landfill and for two full-service landfills. Costs were estimated for both base (IPP-related) and high (IPP- and MX-related) growth scenarios for 1982 and 1987 (the peak growth year).

All five options established a higher level of service for County residents than is presently available, provided the flexibility required to accomodate the anticipated population growth and fluctuations, and eliminated the environmental, public health, and safety problems associated with open dumps.

The recommended alternative was developed after receiving input from County Commissioners and officials, the mayors and/or representatives of each of the incorporated areas, the Utah State Division of Health, and the Region VIII U.S. Environmental Protection Agency, at meetings in Millard County. Greenbox collection was proposed for compactable waste, while roll-off containers, placed near each incorporated area, were proposed for bulky wastes. This option maximizes flexibility, as greenboxes can be added or removed more easily and economically from a collection system than can other containers. This feature is vital in Millard County, where the extent and timing of growth is uncertain.

The greenboxes will be serviced by two side-loading collection vehicles, while roll-off containers will be transported by a tilt-frame truck. A single, regional sanitary landfill, located southeast of Delta, will receive all compactable waste produced in the County, as well as the bulky wastes generated in West Millard County. This site will be supplemented by a bulky waste disposal site at the present Fillmore site, which will service East Millard County. Each disposal site will require a track dozer for spreading, compacting, and covering waste.

Specific recommendations for closure of the 14 open dump sites are detailed in a three-year plan which is estimated to cost approximately $213,000. Equipment required for this task includes a crawler loader, a dump truck, and a tractor.

The staff required to operate the collection and disposal system and perform open dump closure include; two side-load vehicle drivers, (one full-time and one half-time), one half-time roll-off vehicle driver, a bulky waste site operator (half-time), a full-time regional landfill operator, and two staff members conducting open dump closure (one full-time and one half-time employee). In addition to the five full-time staff memebers described above, it was recommended that a general manager and secretary be hired to oversee administrative and billing duties, respectively.

The total yearly cost of the system was estimated at $429,800. The amortized capital cost (10 percent over 10 years) was $161,400, while operating costs were estimated to be $268,400. It was suggested that capital costs would be financed through the use of general funds or bonding. User fees could be utilized to cover capital and operating expenses, resulting in a residential household user fee of $6.30 per month.

The formation of a County-wide Solid Waste Advisory Board was recommended to manage the system. The Board, consisting of representatives from each incorporated area, would be responsible for financial, operational, and planning decisions regarding solid waste. An implementation schedule was provided, which lists the approximate time periods required to complete the steps necessary for system initiation. The evolution of the system, from 1982 to the year 2000, was described. The solid waste management system has been designed to accomodate peak year (1987) requirements for equipment and labor needs. After open dump closure is complete (two to three years after initiation) the extra labor and equipment capacity will be needed to accommodate the 1987 collection and disposal needs. Efficient operation, possible with some overtime, will be necessary in 1987. The operating cost of the system should increase by 51 per cent from 1982 to 1987, while population grows by 56 per cent. Capital costs will remain constant, until equipment requires replacement around 1990.

In the early summer, 1982, the Intermountain Power Agency announced the possibility of reducing the planned size of its 3,000 megawatt plant to 2,225 MW or less. Some of the entities which are part of the IPA consortium indicated that their future demand for electricity might be significantly less than originally predicted. If the power plant is constructed on a smaller scale, the population and the resultant solid waste generated associated with the construction and operational phases of the plant will be less than predicted in this report. If the recommended collection and disposal system has to be scaled downward, Appendix F of this report details the calculations which were used to develop the individual components of the system. In many cases, the recommended system is linear in that size of the landfills, the number of greenboxes, required labor hours, etc. can be reduced by the ratio of actual population to predicted population. One of the first responsibilities of the County's solid waste manager will be to reevaluate the population and the recommended soild waste system. Background calculations and notes used, in developing the system will be provided to Millard County upon request.

I. INTRODUCTION

A. Background

Millard County, Utah is experiencing solid waste disposal problems that are typical of many rural areas. These problems include a large number of uncontrolled disposal sites, characterized by a lack of daily cover of waste, open burning, and indiscriminant dumping. In addition to aesthetic problems, these conditions may cause ground or surface water pollution, and present potential public health and safety hazards.

This situation will be exacerbated, as Millard County is expected to experience rapid growth. Thus, it is similar to many other "boom towns" in the western United States. Population is increasing due to the present construction of the Intermountain Power Project (IPP), which is an electric power generating station. The MX missile system may also affect County population. Projections of total County population growth for the period from 1982 to 1987 have been estimated to range from 60 to 140 percent, depending upon which growth scenario is utilized. This influx of population can be expected to present a number of difficulties in providing necessary additional public services such as solid waste management.

In an attempt to resolve the existing situation and avoid future problems, officials from the City of Delta and Millard County have requested assistance from the Environmental Protection Agency (EPA) in developing a solid waste management plan. This request is submitted through the Technical Assistance Panels (TA Panels) program, which makes expertise available to State and local governments in accordance with the Resource Conservation and Recovery Act (RCRA) of 1976, Section 2003. This expertise may include technical, marketing, financial and institutional specialists who aid in the development and implementation of plans which manage hazardous wastes, assure proper disposal of solid wastes, and conserve resources through waste reduction and recovery.

EPA Region VIII has approved the Delta/Millard request for assistance, and has directed Fred C. Hart Associates, the primary Region VIII Panels contractor, to conduct this study. The study will provide a recommended solid waste management plan for Millard County which best accomodates the current and future needs of the County, taking into account projected growth and other local conditions. In addition to serving as a direct aid to Millard County, however, this study is also intended to serve as a model and provide discussion of solid waste issues for other rapidly growing rural areas.

Before examining the Millard County solid waste situation, the scope of the study and a brief discussion of general characteristics of the County are presented. These characteristics (including land use, issues and trends, population, etc.) will play a major role in determining the substance of the recommended solid waste management system.

B. Scope of the Study

The objective of the study is to aid Millard County in developing an environmentally sound and cost effective waste collection and disposal system. A generalized outline of the scope of the study follows. Initially, the County's population will be projected, through the year 2000, for each city, town, and unincorporated area. The quantities, characteristics, and variations of solid waste generated throughout the study period will be projected. Several alternative disposal sites will be evaluated and collection and disposal alternatives, and associated costs shall be developed. Various methods for financing solid waste expenditures, including the collection of fees from users, will be discussed.

Types and quantities of special wastes generated in the study area will be identified, and existing disposal practices evaluated. Recommendations for proper special waste disposal will be made. A glossary defining solid waste technical terms will accompany the report.

Based on the comments received from Millard County officials, the State, and EPA, a recommended solid waste management plan will be selected. The plan will include: recommended landfill sites, practices, and a site plan; a landfill operation plan, including scheduling of equipment and staff, and hours of operation; a waste collection staffing plan; a list of equipment required for collection and disposal of waste; recommendations for approximate locations of greenbox and roll-off containers; site-specific disposal plans for special wastes; and costs (capital, operating and maintenance) associated with the system. Site-specific plans for closure and clean up of existing disposal sites will also be developed.

An institutional (management) plan and system of financing the selected alternative will be recommended, based on input from local elected officials. Finally, a schedule for implementing the plan, and draft solid waste regulations will be provided.

II. DESCRIPTION OF THE STUDY AREA

A. General Characteristics

Definition of the Study Area

The study area for this analysis consists of Millard County, Utah. The County contains ten incorporated cities/towns,which may be divided into West and East Millard County:

West	East
Delta	Fillmore
Lynndyl	Holden
Leamington	Scipio
Oak City	Meadow
Hinckley	Kanosh

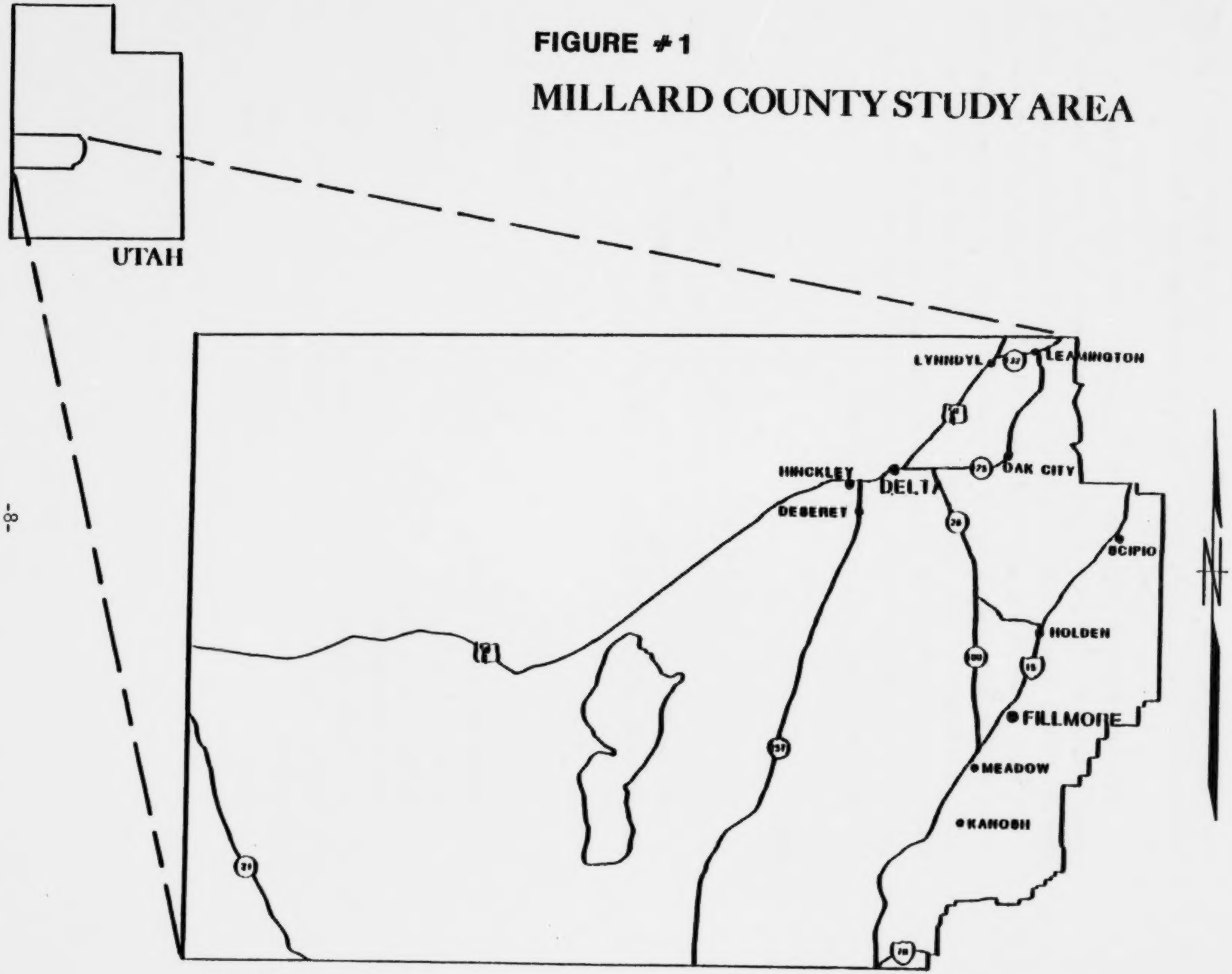
The locations of these cities, along with several unincorporated settlements, are shown in Figure 1. The incorporated cities are all located in the eastern section of the County. In local terms, "West Millard" means the area consisting of the first group of five communities listed above, while "East Millard" consists of the second group of five cities. These terms, then, do not refer to the entire County, but rather to the populated area located in the eastern part of the County. The western part of the County (e.g., everything west of Hinckley) is a very dry, undeveloped and low density area. The town of Garrison, not shown in Figure 1, is located on the extreme western edge of the County.

Historic

Millard County is located in the west-central part of the State. The area has undergone several economic/social development phases after initial colonization by the Mormons in the 1850's. Mormon settlement followed a definite organized pattern based on religious concepts, with water availability determining

FIGURE #1

MILLARD COUNTY STUDY AREA


UTAH
LYNNDYL
LEAMINGTON
OAK CITY
HINCKLEY
DELTA
DESERET
SCIPIO
HOLDEN
FILLMORE
MEADOW
KANOSH

Millard County, Utah

SOURCE: FRED C. HART ASSOCIATES, INC

the location and size of every settlement. Irrigation efforts begun time allowed much of the dry desert land to function as agricultural land.

With the onset of railroads into the area in the 1870's, markets for regionally-produced sugar beets, grain and stock were developed. Later in the century Millard County experienced growth and development from regional mining activities. After mining activities died down, many of the residents remained in the area as agricultural activities expanded. Growth in the County continued until approximately 1930 when the population reached approximately 10,000. Population steadily declined until around 1970, when increased activity in mining, transportation and other sectors created a healthier, more diverse economy. The 1981 population is estimated to be about 9,200.

Land Use

A 1978 land use inventory shows that the primary land use within the County is agricultural. The vast majority of the land, however, is undeveloped. Much of this land is owned and managed by the Federal government, as shown in the land ownership survey of the County (in acres):

		Percentage of Total
Bureau of Land Management	3,016,403	71%
Forest Service	361,707	8.5
Bureau of Reclamation	599	-
Indian Reservations	37,683	-
Total Federal	3,416,390	80
State	402,659	9
Private	473,951	11
Total	4,254,720	100%

Issues and Trends

Through a comparison of the County's history, current status, and goals for the future, several important issues and trends become readily apparent. These include urbanization, inflation, recognition of the barriers to development and the need for planning, and changes in the quality and/or style of life. Each is briefly discussed below.

Urbanization. Signs of increasing urbanization are very evident. While there are no traffic jams or similar symptoms of an urban society, if one examines the shortage of hotel/motel space, the presence of new residents and visitors arriving from urban areas expecting the comforts and services offered by a city, and increasing local and regional economic activity, the conclusion is reached that Millard County's traditional rural lifestyle is undergoing significant changes. As discussed further below, the Intermountain Power Project and Missile X (MX) development will be the major future determinant of the pace, scope, and magnitude of urbanization.

Inflation. Although a problem throughout the world, inflation tends to hit fast-growing areas much harder than other, more stable areas. General signs of inflation in Millard County include increasing land values, competition for scarce resources, increasing consumer prices, etc. These impacts affect everyone, but are especially significant to economic sectors which pay lower wages and generate a smaller margin of profit (such as agriculture), retirees, and governments whose fiscal tax revenues lag behind cash outlay for public facilities and services.

Barriers to Development. Generally, Millard County communities and individual citizens have expressed a strong support for future growth and development. It is clear, however, that there exist several important barriers to encouraging and managing this development. For example, the County Commissioners Organization (a voluntary cooperative association consisting of representatives of Millard, Juab, Piute, Sanpete, Sevier and Wayne Counties) has recognized the following physical, social/cultural, and economic barriers to development:

- lack of water resources management;
- poor medical and social service delivery systems;
- insufficient transportation systems;
- poor community image;
- lack of community facilities;
- lack of tax base;
- continued un- and under-employment;
- ineffective tax structure; and
- an unattractive economic base for business development.

Importance of Planning. As a corollary to the above discussion, the importance and necessity of planning has been realized by most communities and decision-makers. In this regard, the Millard Intergovernmental Cooperative Alliance (MICA) has been formed. MICA, consisting of representatives from all incorporated taxing entities and districts in the County, is an attempt to solve existing deficiencies and lessen or avoid future disruptions. Additionally, comprehensive planning efforts are underway for all incorporated and unincorporated portions of the County in an attempt to define and understand problems and issues, and to formulate strategies and policies to reach desired goals.

Decision-Making Structure

Generally, the decision-making structures of Millard County and communities within the County are typical of other rural western areas. There are three County commissioners, one of whom is chosen to be chairman of the Commission. The Commissioners generally determine County priorities, and must officially approve all facets of County plans, policies, procedures and other business. A group of several elected officials (e.g., Sheriff, County Clerk, Recorder) and appointed staff (e.g., County Administrator, Road Department crew, Nurse, Industrial Development staff) reports directly to the Commissioners through both formal and informal procedures. Cities and towns in the region have a mayor and may, depending upon size and resources, also have a small staff and/or trustees. Local political support, especially from the County government, will be a necessary prerequisite to the successful implementation of any solid waste plan.

B. Future Growth and Population Projections

Major Future Industrial Development

Although still a rural county with a low population density, two major projects planned for the area, the Intermountain Power Project (IPP) and Missile X (MX) deployment, will play a major role in determining the future of the County. A description of these projects is presented below, while a discussion of their potential significance to the County's future growth and development pattern is presented in the next section.

Intermountain Power Project. The IPP is a proposed 3,000 Megawatt coal-fired electric power facility. Its planned location is approximately ten miles north of Delta in Millard County. The site will occupy about 4,640 acres. IPP is proposed and owned by the Intermountain Power Agency, a consortium of 23 Utah municipalities. The agency, as a subdivision of Utah State government, will finance the project with several issues of tax-exempt revenue bonds. Much of the power, however, will be exported for electrical needs to Southern California. Site preparation began October, 1981, with construction of the generating station scheduled to start approximately one year later. Indications are that the IPP will definitely be developed.

MX Development. The MX mobile missile system has been proposed as a major element of the U.S. strategic deterrent. It is designed to maintain the survivability of the U.S. land-based strategic missile force through the multiple protective shelter system. This concept requires relatively few (200) mobile MX missiles moved among a relatively large number (4,600) of shelters. The proposed deployment alternative, prior to recent Federal decisions, was the location of all 200 missiles in the Nevada/Utah area, which includes Millard County. Millard County had been considered as a primary potential site for an operating base and/or missile locations which would require extensive amounts of land, labor, and other resources. Although MX development does not appear likely to occur at this time (March, 1982), the high growth scenario (IPP and MX-related growth) has been included in this report. The use of the high growth scenario is still valuable if MX development does not occur in the County, as this scenario provides an upper limit of population growth.

Data Constraints

There exists a variety of information concerning potential growth and settlement patterns in Millard county. Sources include:

- personal communications with MICA;
- the MX draft Environmental Impact Statement (EIS);
- IPP reports;
- Bureau of Economic Research Reports by the University of Utah; and
- personal communications with the MX Policy Board.

In examining these projections, problems with the direct application of this material to solid waste planning became clear. Studies prepared during approximately the same period in time show strikingly different results. Even 1981 population estimates by individual community are in substantial disagreement. While some of these discrepancies can be attributed to differences in methodologies and assumptions, it is clear that no population projections exist which are directly transferable to the needs of a solid waste management plan. For example, year-by-year projections are desirable, although they will have to be altered on a continual basis as growth conditions change. Ideally, these year-by-year projections should be broken down by community so that collection routes and schedules (a direct impact on efficiency and costs) can be evaluated and compared. Additionally, under the major planning problem of uncertainty, a scenario approach is highly desirable in order to understand the implications of the occurance of certain actions. The scenarios for this study consist of base growth (IPP-related growth) and high growth (IPP- plus MX-related growth). At this time, the base growth scenario appears most probable. Under ideal circumstances, a set of reliable, up-to-date, year-by-year, town-by-town, scenario-by-scenario population projections are needed to fully understand the existing and potential future solid waste quantities and distribution. Such a set of projections was not available for this analysis.

Under these circumstances, there were two basic options for obtaining the required solid waste plan population inputs. They involved mixing and matching projections from the variety of sources, or choosing one source as a starting point and modifying these estimates as necessary after discussions with knowledgeable observers.

Because of the obvious problems caused by mixing conflicting and inconsistent data, the latter alternative was chosen. Population estimates for 1981 and projections for five year increments (1985, 1990, 1995, and 2000) were obtained from MICA in May, 1981. They were chosen as the starting point for preparing the required estimates, because they were based on direct contact with IPP and MX planners as these projects evolved during 1981, and because they were developed for each town for both the base and high growth scenarios. Information from the U.S. Census Bureau was not used, as detailed MICA data were considered more accurate. Obvious discrepancies and inconsistencies which could not be verified by planners and consultants to IPP and MX were eliminated. The decision was made to use straightline interpolation with the five-year points to obtain rough estimates of year-by-year population. While growth will certainly not take place in such a constant manner, it is adequate for this analysis. The one remaining piece of missing information concerned the population estimate for, and year of, peak growth. It was determined from IPP and MX reports that the peak year for the base growth scenario would be 1986, while for the high growth scenario the peak would occur in 1988. For the purpose of this study, 1987 was chosen as the peak growth year. Additional County-wide population (beyond the 1985 estimate) for the peak year for each scenario was estimated, and this population was allocated to specific communities in the same proportions as 1985 estimates. This methodology resulted in a set of population estimates for solid waste planning.

While these estimates are reasonable, based on existing information, they are still estimates. With plans changing at a rapid pace throughout the County, projections prepared six months from now may be significantly different than those presented here. However, actual quantitative estimates presented here or elsewhere are not as important as examining trends. A solid waste management system that will provide flexibility to accomodate rapid and unforeseen changes in population must be developed. Changes will have to be monitored as they occur, so that solid waste management plans can be updated on a continual basis.

County Population Projections

Based on the assumptions outlined in the previous section, Millard County's population has been projected for the years 1982 through 1990, 1995 and 2000. Table 1 presents data for 1982, 1987 and 5-year increments. These population projections were used to determine present and future waste generation. Figure 1-A illustrates historic and projected population estimates.

Two important observations can be made from the data. First, under the base growth scenario, total population could be more than one and a half times the present population by 1987. This scenario consists of a 9.3 percent average annual compounded growth rate for the five years between 1982 and 1987. Under the high growth scenario, total County population could be two and a half times the present population, with a 14.6 percent average annual compounded growth rate.

The second observation relates to the cyclic nature of the growth, in which population actually declines after the mid-late 1980's. This decline is primarily due to a switch from the IPP/MX construction phases to the operational phases, which are less labor intensive. Population continues to increase after 1990, in the base growth scenario, and generally declines in the high growth scenario.

Settlement Patterns

Settlement patterns of in-migrants will depend upon a number of variables, including proximity to employment, level of services and public facilities provided by a given community, and available transportation routes.

Recent boom-town case studies indicate that the organization responsible for the growth plays a major role in settlement patterns, either directly or indirectly. For example, both the IPP and MX planners have indicated a desire to provide housing arrangements (single family, multi-family, construction camps, etc.) in specified areas to influence where workers settle, and therefore alleviate some of the public service and facility pressures which are likely to occur.

TABLE 1

POPULATION PROJECTIONS

MILLARD COUNTY, UTAH

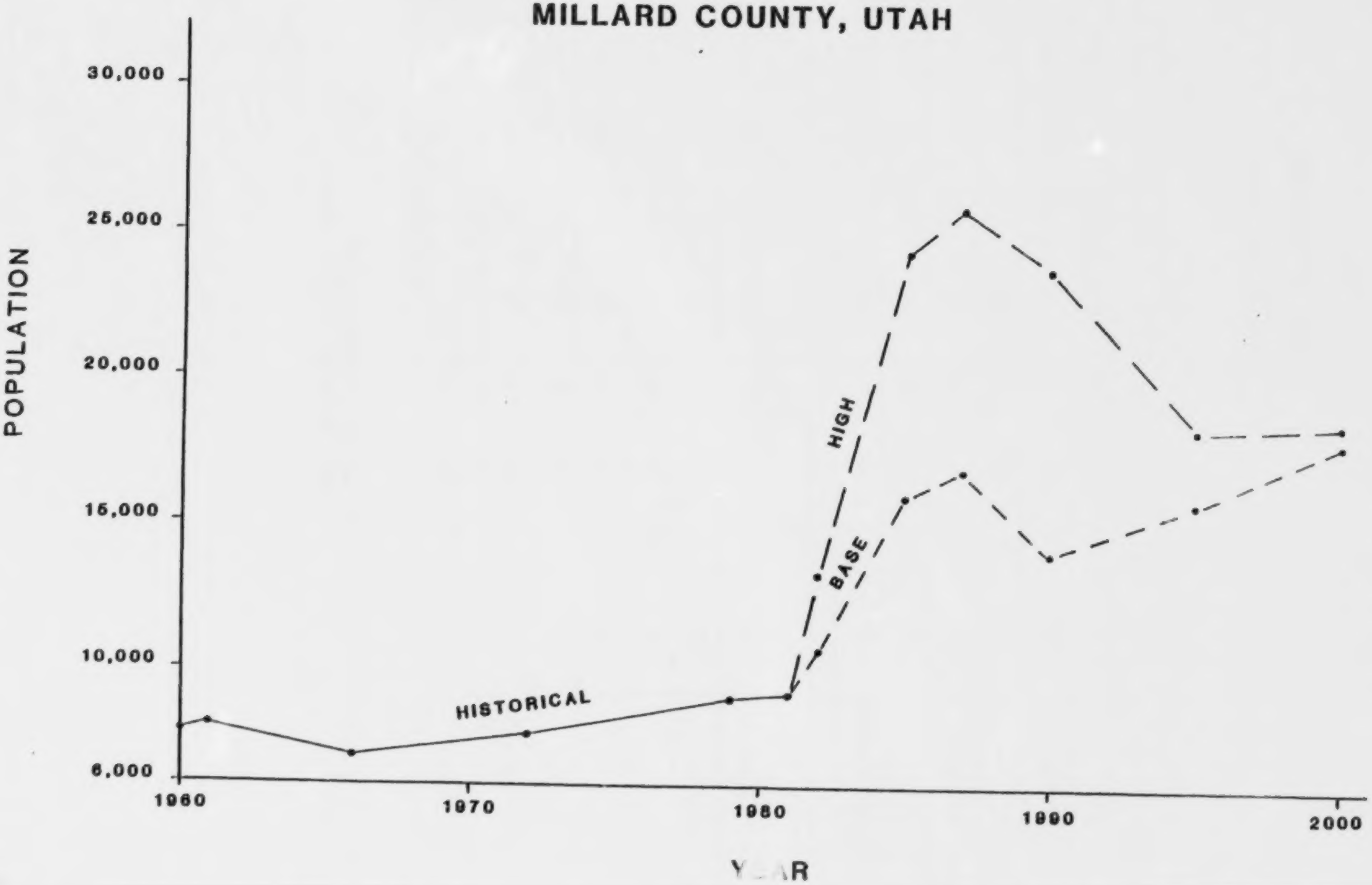
	1982		1985		1987		1990		1995		2000	
WEST MILLARD	Base[1]	High[2]	Base	High	Base	High	Base	High	Base	High	Base	High
Delta	3,185	4,350	5,725	10,300	5,950	10,900	4,400	9,600	4,875	6,500	5,425	5,750
Hinckley	710	750	1,200	1,300	1,250	1,365	925	1,025	1,025	1,125	1,150	1,250
Lynndyl	165	175	350	350	355	365	275	275	325	325	400	400
Leamington	135	190	300	300	325	325	250	250	275	275	325	325
Oak City	470	470	825	825	850	875	625	625	700	700	775	775
Unincorporated	1,830	1,850	2,150	2,280	2,320	2,400	2,090	2,280	2,450	2,450	2,870	2,870
EAST MILLARD												
Fillmore	2,300	3,190	3,000	6,500	3,290	6,900	3,050	7,000	3,475	4,000	3,975	4,150
Meadow	315	315	350	350	385	385	375	375	425	425	475	475
Kanosh	395	400	425	425	455	460	425	475	525	525	550	550
Holden	500	525	600	675	650	710	600	825	625	625	725	725
Scipio	245	245	325	325	355	355	325	325	350	350	375	375
Unincorporated	570	590	680	720	730	760	660	720	775	775	905	905
TOTAL COUNTY	10,820	13,050	15,930	24,350	16,915	25,775	14,000	23,775	15,825	18,075	17,950	18,550

---

[1] Base growth scenario, as defined in text (IPP - related growth)
[2] High growth scenario, as defined in text (IPP and MX - related growth)

FIGURE 1-A

HISTORICAL AND PROJECTED POPULATION
MILLARD COUNTY, UTAH



C. Implications of Projected Growth

Planning Constraints

Growth of the magnitude described in the above population analysis places tremendous pressure on existing public systems, facilities, and services. Effects of these pressures are well documented from case history studies of western boom-towns such as Rock Springs and Gillette, Wyoming and Craig, Colorado. The traditional planning mechanisms from which to prepare for growth are typically not in place in these low-density, rural western areas. This situation is generally due to a lack of three very important resources:

- money for front-end financing of needed facilities and services;
- accurate, reliable, up-to-date information which would be used as a basis for planning and decision-making; and
- management and planning expertise.

Lack of these resources, combined with an incomplete recognition and comprehension of the problems which must be faced and the difficulty of changing citizen habits, perceptions and attitudes, make planning a very difficult task.

Due to the underlying uncertainty over the extent of development and population growth and because of the potential for cyclic or inconsistent growth, planning efforts need to incorporate flexibility to the greatest degree possible. While this is certainly not practical in providing some services which require long lead times for development (e.g., a water treatment facility), flexibility is possible in other areas. This is true in many instances of solid waste planning. A modular approach to solid waste management, in which systems designed for a specified number of individuals can be grouped together in tandem to serve a larger population as new growth actually occurs, can save time and money. However, this approach does have its limits, and it would not be efficient to provide a system of many small parts when a system with a smaller number of larger parts provides immediate benefits through economies of scale.

Boom-Town Solid Waste Management

One of the biggest problems facing communities undergoing rapid growth is the lack of front-end capital to finance needed improvements. During the initial planning process, priorities must be made which place immediate human needs (e.g., shelter, water, etc.) on a higher level than other needs.

Therefore, solid waste management, as a historical "out-of-site, out-of-mind" concern, is typically given a low budget and planning priority. This is obviously an example of short-sighted planning, but given the resource constraints, the lack of attention to solid waste is a reality which can only be modified through a change in priorities or the acquisition of additional funds and expertise.

In the case of Millard County, which is already faced with the difficult task of solid waste cleanup resulting from years of inadequate management (as discussed in the next Chapter), a situation of additional rapid growth and urbanization would create solid waste management problems which would be difficult to resolve physically or financially, unless actions are taken now to prevent their occurrence.

III. EXISTING SOLID WASTE MANAGEMENT CONDITIONS

A. Applicable Regulations

Federal Regulations

On the Federal level, solid waste management is regulated under the provisions of the Resource Conservation and Recovery Act (RCRA) of 1976. The non-hazardous solid waste provisions of RCRA clearly provide for solid waste planning and management functions to remain with State and local governments. The Environmental Protection Agency (EPA) has provided guidance and funding for the development of State Solid Waste Management Plans and regulatory activities to carry out the plans. The EPA has established minimum criteria for solid waste disposal. Disposal facilities that do not meet these criteria are classified as "open dumps" and may be subject to enforcement action from the State Department of Health or to lawsuits from citizens that are adversely affected by disposal practices. The criteria (40 CFR Part 257) state that:

- Open burning of waste in a landfill is prohibited.
- Waste must be covered with soil or other suitable material at the end of each operating day in order to reduce the risk of fire and to impede the access of disease vectors to the waste.
- Disposal facilities cannot be located within a 100-year floodplain if they will restrict flows, reduce temporary water storage capacity, or result in a washout of solid waste.
- Disposal facilities or practices should not cause or contribute to the destruction of endangered species of plants, fish or wildlife.
- Disposal facilities cannot cause pollution of surface waters unless discharges are permitted under the provisions of the Clean Water Act.

- The disposal facilities should not cause the contamination of a ground water source or potential ground water source beyond the boundaries of the disposal site.

- The disposal facility should not cause high levels of explosive landfill gas in facility structures or permit high levels of the gas to migrate beyond the property boundary.

- Due to the potential for bird hazards to aircraft, facilities that dispose of putrescible waste cannot be located within 10,000 feet of any airport runway used by turbojet aircraft or within 5,000 feet of any airport runway used by only piston-type aircraft.

- Access to disposal sites must be controlled.

The guidelines described above are to be followed by State and local governments in order to be in compliance with RCRA. No Federal permit is required to open or operate a solid waste landfill facility.

State Regulations

The State of Utah has developed a Code of Solid Waste Disposal Regulations based on statutory authority and responsibility conferred by Section 26-15-5, UCA, 1953 as amended in 1974. These regulations, enforceable throughout the State, are designed for adoption and enforcement by local Health Departments in cooperation with the State Division of Health. The regulations, presented in Appendix A, specify that it is unlawful for any person to deposit any solid waste in any place except at a site that has been designated by a city, county, district, or other properly designated agency, and approved by the Utah State Division of Health. This requirement does not include the deposition of inert construction debris used as fill material or mine tailings and overburden, provided such deposition does not cause a public nuisance or hazard or contribute to air or water pollution. No solid waste disposal site may be operated without the approval of the Division.

Landfill design plans must be submitted to the State for site approval, and must include: exact location of the site, current land use, zoning within 1/4 mile of the site, surface drainage and general topography; population and area to be served; size of the site; provisions for special waste handling; estimates of waste types, quantities and sources; soil descriptions; availability of cover material; equipment to be used; provisions for fire control and year-round accessibility (including an all-weather road); proposed fencing (for access and wind); evidence of land ownership or lease agreement; and any other information requested by the Division.

After approval by the State, sites must be operated such that: waste is compacted to the smallest practical volume and covered with at least six inches of cover each operating day; a minimum of two feet of final cover is applied; adequate equipment is available for operations; open burning does not occur; adequate fire protection is provided; and litter, dust, insect and rodent control is provided. Provisions for hazardous and special wastes and open dump closure are also specified.

Although the State has the final authority for landfill site approval, the Central Utah District Health Department is also involved in solid waste decisions in Millard County. This six-county agency administers several environmental health programs, including solid waste. The governing body for the Health Department is the six-county Local Board of Health. The District Health Department has the authority to establish and enforce solid waste regulations, but to date, State regulations have been followed.

Prior to 1977, when Federal RCRA regulations came into effect, the State of Utah performed periodic inspections in Millard County. At present, the State does not inspect sites unless complaints or requests are received. The District Health Department will be increasingly responsible for disposal site inspections and enforcement of regulations.

Local Regulations

Neither Millard County nor any of the incorporated areas within the County have developed a specific solid waste disposal ordinance. However, the County is in the process of planning for the future through the preparation of a series of municipal and County-wide comprehensive plans prepared by Paul Nelson Associates. Once the plans are adopted by the Board of County Commissioners and individual communities, ordinances for public services will be developed as a strategy to attain the desired goals contained within the plan. Much of the information generated within this County-wide solid waste management plan will be used as a basis for a solid waste ordinance, as further discussed in Chapter VI.

B. Existing Services and Facilities

1. Waste Generation Zones

For the purpose of solid waste planning, the County has been divided into East Millard and West Millard waste generation zones (see Figure 2). Both zones are located in the eastern one third of the County. The western two thirds of the County, which includes the town of Garrison, is not included in these waste generation zones. Collection and disposal service for this area will be discussed in Chapter VI.

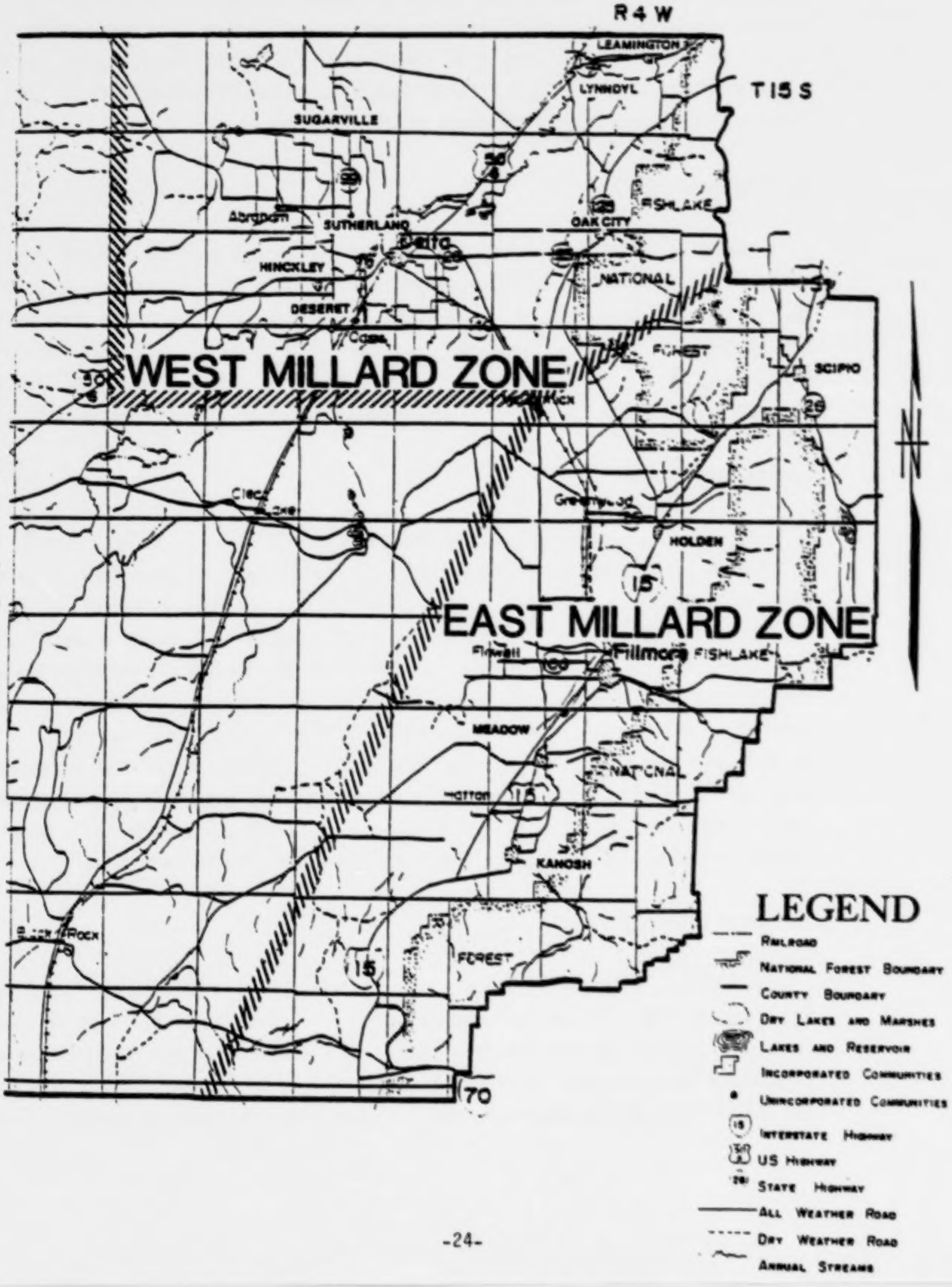
The East and West Millard zones were delineated due to geography and road access. East Millard consists of Fillmore, Meadow, Kanosh, Holden, Scipio, and 24 percent of the total County unincorporated population. This figure was derived from 1980 population data provided by Paul Nelson Associates. The West Millard waste generation zone includes Delta, Hinckley, Lynndyl, Leamington, Oak City, and 76 per cent of the total unincorporated population in the County.

2. Waste Collection Services

East Millard Zone

Fillmore residents and businesses are charged a mandatory solid waste collection fee of $2.00 per month, by the City. The City pays Mr. Lloyd Keel

Figure 2
WASTE GENERATION ZONES
Millard County, Utah


R 4 W
T 15 S
LEAMINGTON
LYNNDYL
SUGARVILLE
Abraham
SUTHERLAND
Delta
HINCKLEY
DESERET
Oasis
OAK CITY
FISHLAKE
NATIONAL
FOREST
SCIPIO
WEST MILLARD ZONE
McCornick
Clear Lake
Greenwood
HOLDEN
EAST MILLARD ZONE
Flowell
Fillmore
FISHLAKE
MEADOW
NATIONAL
Hatton
KANOSH
FOREST
Black Rock
15
50
6
70
26
100
125
LEGEND
Railroad
National Forest Boundary
County Boundary
Dry Lakes and Marshes
Lakes and Reservoir
Incorporated Communities
Unincorporated Communities
Interstate Highway
US Highway
State Highway
All Weather Road
Dry Weather Road
Annual Streams

$1,100 per month for weekly collection of approximately 900 residential and commercial accounts. A flatbed truck is used for collection, and waste is disposed of at the local Fillmore dump site (see Figure 3). Other incorporated and unincorporated areas in the East Millard zone have no collection services. Waste is transported by individuals to local disposal sites.

West Millard Zone

The City of Delta is not involved in waste collection. Don's Sanitary Service provides weekly collection for approximately 20 businesses and 80 residences in the Delta area, for a monthly fee of $6.00 . Equipment in use is a pickup truck. Disposal takes place at the Delta disposal site (see Figure 3). No collection service is available to residents in the remainder of the West Millard zone. Waste is hauled by individuals to local disposal sites.

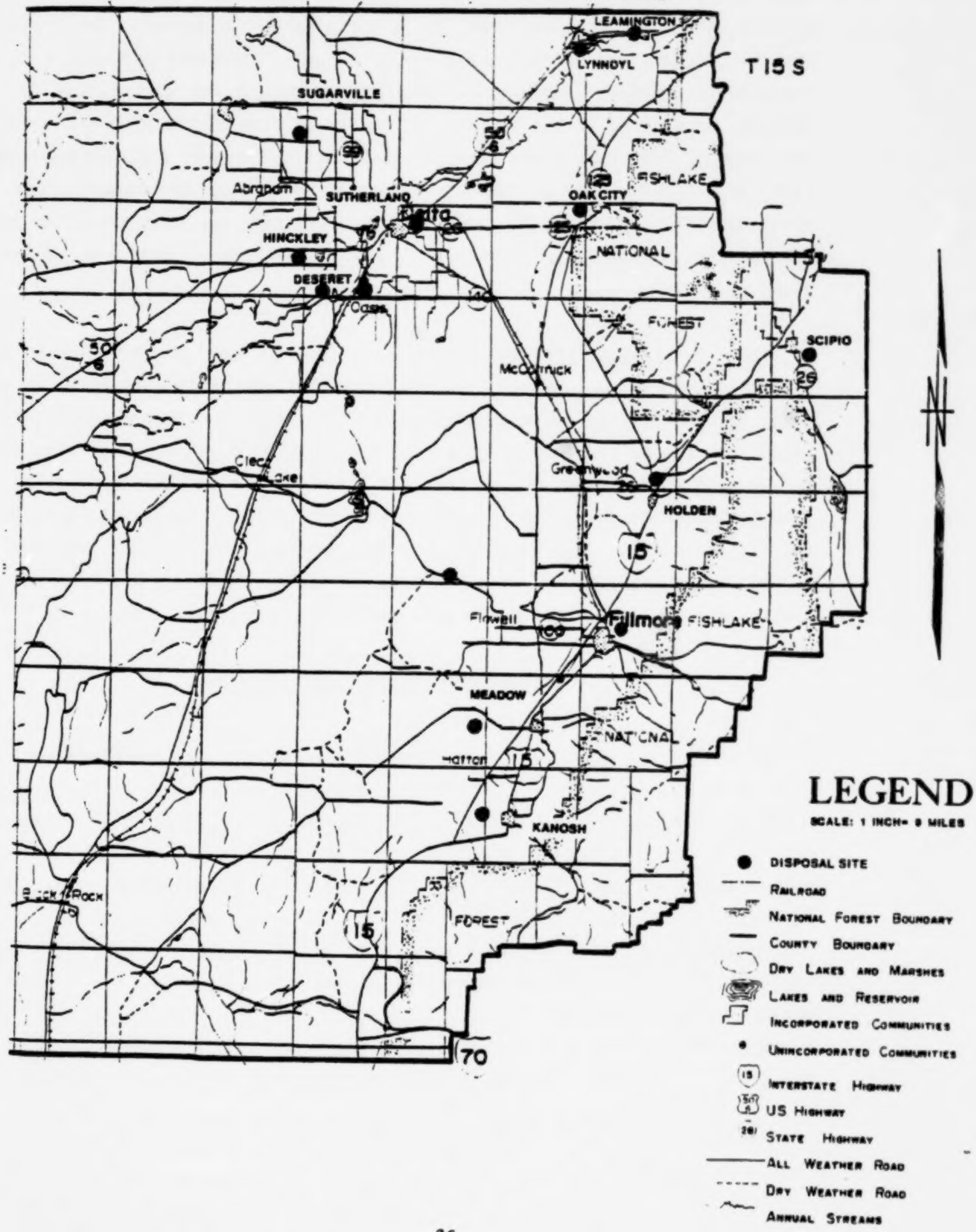
Federal Collection

Fishlake National Forest provides a five cubic-yard trailer in six camp grounds in eastern Millard County. Waste is collected by Forest Service personnel and transported to an approved landfill site in Sevier County. Forest Service personnel estimated that approximately twenty five cubic yards of waste are collected weekly, for the service period of May through November. Communication with local Forest Service waste authorities indicates that the agency is interested in contracting a private business to collect waste. Currently, a fee of $.75 per cubic yard is paid for disposal in Sevier County. If an approved site were available in Millard County which was more convenient than the presently used site, the agency would dispose of waste at that site. No other Federal or State collection service is in operation in the County.

3. Waste Disposal Sites

Currently, at least 14 waste disposal sites exist in the County (see Figure 3). Appendix B contains an example of a 1977 Utah State Division of Health inspection report for the Hinckley site. This sample form has been included to illustrate environmental problems at County disposal sites. Inspection forms for other sites may be obtained from the Utah State Division of Health. A copy

Figure 3
EXISTING DISPOSAL SITES
Millard County, Utah


R4W
T15S
LEAMINGTON
LYNNDYL
SUGARVILLE
Abraham
SUTHERLAND
Delta
HINCKLEY
DESERET
Oasis
OAK CITY
FISHLAKE
NATIONAL
FOREST
SCIPIO
McCornick
Clear Lake
Greenwood
HOLDEN
Flowell
Fillmore
FISHLAKE
MEADOW
NATIONAL
Hatton
KANOSH
FOREST
Black Rock
50
6
15
70
N
LEGEND
SCALE: 1 INCH= 8 MILES
DISPOSAL SITE
RAILROAD
NATIONAL FOREST BOUNDARY
COUNTY BOUNDARY
DRY LAKES AND MARSHES
LAKES AND RESERVOIR
INCORPORATED COMMUNITIES
UNINCORPORATED COMMUNITIES
INTERSTATE HIGHWAY
US HIGHWAY
STATE HIGHWAY
ALL WEATHER ROAD
DRY WEATHER ROAD
ANNUAL STREAMS

of the forms for each of the sites will be sent to the County under separate cover as a supplement to this report. All sites exhibited evidence of open burning, and some sites were burning at the time of the survey. The presence of vectors, odors, dead animals and blowing litter, inadequate protection of water resources, unsightly appearance, and infrequent or no application of cover material were noted by the Division of Health as some of the problems evident at the sites. The Utah State Code of Solid Waste Disposal Regulations (amended 1974, Appendix A), states that waste must be compacted and covered each operating day, that open burning shall not be permitted, and that the sites must be operated in a manner that controls blowing litter, dust, odor and vector problems.

Each open dump site has been classified as one of three basic types, according to size, topography, and potential for ground or surface water pollution, for the purpose of developing specific closure and cleanup plans. Type I sites are located in large, flat areas with no defined drainage. A high seasonal groundwater table exists at the West Millard sites of this type. This site type includes the Sutherland, Deseret, Deseret-Oasis, Hinckley, Holden, Meadow, and Flowell sites. Type II sites are smaller than Type I sites, are moderately sloping, and may present surface water pollution problems. Type II sites include the Oak City, Scipio, Kanosh, and Fillmore disposal sites. The third

OPEN DUMP SITE CLASSIFICATION

TYPE I		TYPE II		TYPE III	
Site	Size (acres)	Site	Size (acres)	Site	Size (acres)
Sutherland	50	Oak City	30	Leamington	10
Deseret	100	Scipio	5	Lynndyl	4
Deseret-Oasis	1,000	Kanosh	10	Delta	10
Hinckley	70	Fillmore	40		
Holden	40				
Meadow	3				
Flowell	10				

site type is located at least partially in a natural drainage. These sites are the smallest of the three types, and slopes are moderate to severe. Surface water problems are more likely at these sites, as they are generally located less than 1/4 mile from perennial streams, and may be located in intermittent drainages. Type III sites include Leamington, Lynndyl, and Delta disposal sites. Recommendations for closure of each site are included in Chapter VI. The site types and estimated size of each site are presented below. Approximately 1,400 total acres have been disturbed, according to field appraisal.

The Utah State Code of Solid Waste Disposal Regulations states that open dumps must be phased out in accordance with the following requirements: the absence of rats and vermin must be established; all fires must be extinguished before final cover is applied; all solid waste must be consolidated, compacted and covered with at least two feet of suitable cover material; final grading of the site must provide proper drainage; and, if feasible, the area should be revegetated.

4. Solid Waste Budget

Millard County has no designated solid waste budget. The County's total budget for 1981 was $3,529,210, and is projected to increase by 15-20 percent in 1982. The City of Delta currently pays $800/month to have the Delta disposal site covered once weekly, and the County contributes $300 of that fee out of the general fund. The City of Fillmore has a private contract for maintenance of the Fillmore site for a fee of $450 per month. Waste is moved to designated areas, spread, and partially covered. Fillmore collects a solid waste fee and pays $1,100 per month for weekly collection service, as mentioned previously.

C. Solid Waste Types and Quantities

In formulating an efficient solid waste management plan for Millard County, current and projected solid waste volumes must be developed. Because detailed data concerning existing waste generation sources, rates, and waste composition are not available, standard assumptions (modified by field observations and considerations specific to Millard County) will be used to compute waste generation rates. These rates will be applied to population estimates to determine yearly and total waste volumes for the twenty year study period. This volume information is needed for: the determination of minimum landfill size and presence of sufficient cover; proper sizing of collection and landfill equipment; and formulation of the proper method, operational plan, and cost of disposing of the waste.

The waste types (commercial, residential, demolition and construction, and special wastes) relevant to Millard County are described and further classified as compactable and non-compactable, because compaction greatly reduces the volume needed for disposal or transfer facilities.

1. Waste Types

Residential compactable waste consists of discarded food, paper, cans, bottles, textiles, small appliances, grass and shrub clippings and garden waste. This waste is the highest volume generated, with peaks in the first six items occurring on holidays, particularly Christmas. The last three items are seasonal components of the waste stream. Nearly all generation will occur during the growing season, with peaks in early spring and early fall when pruning takes place.

Residential non-compactable waste includes furniture, white goods (refrigerators, stoves, etc.), tree limbs, trunks and stumps, and home demolition and construction waste. These bulky wastes cannot be serviced through a compactable waste collection system.

Commercial compactable waste is primarily paper, cardboard, packaging material, and food waste. Non-compactable commercial waste is included in demolition and construction debris.

Demolition and construction waste consists of wood, concrete, roofing materials, bricks, ashpalt, etc., and is generated from housing or commercial building development or demolition. This waste type will be significant for Millard County.

Industrial waste generated by IPP will be disposed of on-site, according to the facility's proposed plan, and will not be discussed in this study. No other industrial waste is produced in the County.

Millard County is agriculturally oriented, and this is reflected in the County's waste stream. Such special wastes as baling wire, concrete headgates, dead animals, and pesticide containers are present. Other special wastes are septage, car bodies, and hospital waste.

Baling wire is a non-compactable bulky waste generated throughout the County. Approximately 74 percent of the total land in crop production (about 135,400 acres) is used to produce hay. Each bale of hay which remains in the County will add three wires to the waste stream. About 7-8 pounds of wire are produced per ton of baled hay. County authorities report that seven tons per acre, per year of hay is produced. Assuming that 25 percent remains in the County, and one half of that waste is disposed of at disposal sites, about 400 tons per year of baling wire is added to the waste stream.

Another agriculture-related waste is concrete headgates, in evidence at existing dumps. As earthen irrigation canals are replaced by concrete canals, primarily in the Delta area, headgates must be discarded. The quantity of waste has not been estimated.

A third type of special waste is dead animals, contributed from dairy and ranching operation throughout the county. The summary presented in Table 2 was the basis for determining a daily average animal death rate of 4.5 in Millard County.

A higher percentage of animal deaths occurs in the winter and springs. Yearly animal deaths have been decreased since 1950 and the rate will probably continue to drop. This portion of the waste stream is significant from a public health viewpoint, as animals are currently disposed of at existing disposal sites, and are usually not covered.

Pesticide containers are generated primarily at the Delta Airport, and are disposed of at existing disposal sites. Recommendations for special waste handling are included in Chapter VI.

TABLE 2
ANNUAL ANIMAL DEATHS[1]

Animal Type	Average Death Rate Per 1,000/year	Number of Animals	Total Deaths Per Year
Cattle	24	18,767	450
Sheep	44	26,570	1,169
Swine	9	1,894	17
TOTAL			1,636

[1] Utah State University Extension Service, Fillmore, Utah, 1981.

2. Waste Generation Rates

A daily per capita waste generation rate has been developed for each waste type and applied to population figures. Because no data on actual waste generation in the County were available, it was necessary to develop rates. Special conditions in Millard County, particularly the high projected population growth rate, led to modification of the rates from the standard (generally, 3.5 to 5 pounds per capita, per day). An estimate of waste volumes currently produced was made by field observation of Millard County disposal sites. The rates listed in Table 3 also reflect information gathered by Fred C. Hart's subcontractor, Mr. L. Barnes, in a three year study of waste generation in Montrose County, Co. This area is similar to Millard County in its extreme population growth rate, its agriculturally-based (irrigated farming and ranching) economy and its presence in a high desert, rural location. Waste weights and volumes were measured, according to waste type.

TABLE 3

WASTE GENERATION RATES[1]

Waste Type	Compactable	Non-Compactable	Total
Commercial	2.0	---	2.0
Residential	2.3	.5	2.8
Demolition and Construction (includes special waste)	---	1.5	1.5
	4.3	2.0	6.3

---

[1] Pounds per person per day.

Population data have been applied to waste volumes to obtain waste generation rates. A generation rate of 6.3 lb. per capita per day was used for Delta and Fillmore residents, and a 4.3 lb. per capita per day rate was applied to the remainder of the County. This reflects the absence of commercial compactable waste outside of the trade centers. These rates are projected to remain constant throughout the study period. It is likely that MX-related demolition/construction waste could be less than IPP-related demolition/construction waste. THis could be caused by more prefabricated home building associated with the MX growth scenario. Also, less waste will be produced from the modification of existing housing units, as the supply of these units will be depleted.

3. Current and Projected Waste Volumes

Volumes may be projected by assigning a certain weight per cubic yard of waste to each waste type. Waste volume is more significant than poundage, as volume determines landfill size, collection and disposal equipment size, and associated costs. The waste densities used in this study are summarized in Table 4.

Table 5 summarizes the County's waste volume in a town-by-town, scenario-by-scenario approach for the years 1982 and 1987. Because 1986 has been projected as the peak year for IPP-related growth, and 1988 is projected as the peak year for MX-related growth, 1987 waste volumes were used for peak waste volume estimates. Figures for 1982 were used for current waste volumes. These estimates are the basis for cost estimates in Chapter V. Table 6 summarizes projected waste volumes in five year increments for East and West Millard waste generation zones.

TABLE 4

WASTE DENSITIES

Waste Type	Lb/yd^3 (Before compaction)	Lb/yd^3 (After compaction in collection vehicles, transfer vehicles, or stationary compactors)	Lb/yd^3 (In place in the landfill)
Residential			
Compactable	175	500 - 700	1000
Non-compactable	750	750	750
Commercial			
Compactable	175	500 - 700	1000
Demolition and Construction			
Non-compactable	750	750	750

TABLE 5

CURRENT AND PROJECTED ANNUAL SOLID WASTE VOLUMES[1]

(Cubic Yards, Uncompacted)

	1982		1987	
WEST MILLARD	Base	High	Base	High
Delta	31,660	43,240	59,150	108,370
Hinckley	4,100	4,330	7,220	7,880
Lynndyl	950	1,010	2,045	2,110
Leamington	780	1,100	1,880	1,880
Oak City	2,710	2,710	4,910	5,050
Unincorporated	10,560	10,670	13,390	13,850
Total West Area	50,760	63,060	88,600	139,140
EAST MILLARD				
Fillmore	22,870	31,710	32,710	68,610
Meadow	1,820	1,820	2,220	2,230
Kanosh	2,270	2,310	2,620	2,660
Holden	2,890	3,030	3,750	4,100
Scipio	1,420	1,420	2,050	2,050
Unincorporated	3,280	3,400	4,210	4,390
Total East Area	34,550	43,690	47,560	84,040
TOTAL COUNTY	85,310	106,750	136,160	223,180

---

[1] By incorporated and unincorporated area (present and peak years), compactable and non-compactable waste.

TABLE 6

PROJECTED ANNUAL SOLID WASTE VOLUMES[1]

(Cubic Yards, Uncompacted)

Waste Generation Zone	1985		1990		1995		2000	
	Base	High	Base	High	Base	High	Base	High
East Millard	43,570	131,580	44,090	85,290	50,130	55,350	57,000	58,740
West Millard	84,770	79,030	67,780	121,150	76,020	92,760	85,790	89,600
Total County	128,340	210,610	111,870	206,440	126,150	148,110	142,790	148,340

---

[1] By waste generation zone (five-year increments) for both compactable and non-compactable waste.

IV. SANITARY LANDFILL SITE SELECTION

A. Introduction

As directed by the scope of the study, several alternative disposal sites have been evaluated. The selection process utilized in locating potential landfill sites in Millard County involved three phases. The objective was the location of several alternative sites, which offer favorable environmental conditions and economic benefits. In the initial phase of the process, topographic, land ownership, and soils maps were used to determine such factors as terrain, road access, land availability, and soil conditions in the County. Terrain was considered because areas with a slope greater than 15 percent (e.g., along the Pavant or Canyon Mountains) are more subject to erosion problems and equipment operation difficulties. Topographic maps were also used to determine road access. Areas located more than 1/2 mile from an existing improved dirt road were deemed unsuitable, due to the expenses involved in road building. Immediate proximity to surface water bodies (e.g., intermittent streams, canals, or reservoirs) was also ascertained from these maps.

Land ownership was a significant factor in this initial selection stage. Because 80 percent of the land in the County is publicly owned, a high priority was assigned to obtaining public land. In addition to curtailing land availability problems, public land may be leased for a modest fee, thereby reducing capital costs. Private land use in the County includes commercial, residential and agricultural utilization. Employment of public land for waste disposal purposes would optimize usage of the limited amount of private land for the previously mentioned purposes. Soil maps were used to eliminate areas with soils unsuitable for landfilling (e.g., clay, clean sand). When the initial phase was complete, 19 potential areas had been chosen.

The second phase of the selection procedure consisted of evaluation of the 19 potential sites according to the selection criteria outlined below, and a surface field investigation of the sites, resulting in designation of the five most suitable sites. Field investigation of the 19 sites allowed verification of the depth and general type of soil and determination of conflicting land use (e.g., proximity of residences), topographic constraints not evident from maps, and evidence of surface or groundwater problems at the sites. The five most suitable sites are described in a following section. Appendix C contains a map locating the 19 original sites, and lists a brief rationale for the elimination of 14 of the sites. The third phase of the selection process involves determination of soil type and suitability, and ground water depth, at the prospective site or sites. This will require soil borings and the drilling of test wells. Prior to discussing the factors related to site selection, a general description of Millard County's physiography and climate is presented.

Physiographic Setting

Millard County is located in the Great Basin section of the Basin and Range physiographic province, which consists of steep mountains bounded by northerly trending normal faults and separated by alluvium-filled basins. Alluvial fans generally coalesce and extend from the foot of the mountains to the alluvial flood plains or playas in the center of the valley. Surface water from the County drains into Sevier Lake.

Climate

The climate is temperate and arid to semi-arid. Precipitation is fairly well distributed throughout the year but is relatively low in summer. Annual precipitation is greatest near the mountains bordering the area on the east, decreasing steadily with distance from the mountains. Precipitation is predominantly in the form of snow from October through April. Spring and fall rains are gentle while summer rainfall consists largely of sudden short downpours. Winds are generally from the southwest.

The Utah State Climatologist provided monthly normals of temperature, precipitation and evaporation for the Fillmore area and the Delta area (see Tables 7 and 8). Local sources report that precipitation varies widely from year to year. Precipitation is significant in determining potential leachate production in a landfill. The relatively low amount of precipitation County-wide indicates that precipitation-induced leachate production should be minimal. The high evaporation rate further decreases the potential for leachate production.

TABLE 7

CLIMATOLOGICAL SUMMARY

FILLMORE, UTAH[1]

Month	Mean Temperature (°F)	Mean Precipitation (Inches)	Mean Evaporation (Inches)
January	29.0	1.36	-
February	34.2	1.52	-
March	40.4	1.74	-
April	49.3	1.76	-
May	58.4	.78	9.8
June	66.8	.93	11.4
July	76.2	.62	12.8
August	74.3	.99	11.4
September	65.8	.80	8.5
October	53.8	1.14	5.2
November	40.1	1.34	-
December	31.3	1.46	-
Mean Annual	51.6	14.78	75.1[2]

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[1] Unpublished monthly normals, 1941-1970.

[2] Estimated total annual evaporation, supplied by the State Climatologist.

TABLE 8

CLIMATOLOGICAL SUMMARY

DELTA, UTAH[1]

Month	Mean Temperature (°F)	Mean Precipitation (Inches)	Mean Evaporation (Inches)
January	25.5	.53	-
February	32.1	.83	-
March	39.4	.76	-
April	48.3	.83	-
May	58.2	.87	8.3
June	67.0	.56	9.5
July	76.3	.46	10.9
August	74.1	.46	10.0
September	63.9	.48	6.7
October	51.6	.74	3.9
November	37.2	.55	-
December	28.4	.70	-
Mean Annual	50.1	7.77	61.6[2]

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[1] Unpublished monthly normals, 1941-1970.

[2] Estimated total annual evaporation, supplied by the State Climatologist.

B. Selection Criteria

Factors to be considered in evaluating the five potential sites, as directed by the scope of work of this study, include ground water impacts, surface water impacts, availability of cover material (soils), area (size) of the site, availability of land, land use compatibility (zoning), impact on prime agricultural land, haul distance, access, and compatibility with city and County master plans.

Groundwater Impact

In order to accurately assess the risk of ground water contamination by landfill-produced leachate, the depth to groundwater, as well as its flow rate and direction, must be determined. Utah State solid waste regulations recommend that a sanitary landfill should be located at least five feet above the seasonal high water table. For example, if a fifteen foot trench is excavated for landfilling waste, the seasonal high water table will have to be five feet or more below the bottom of this trench (in this case, the seasonal high water table should be no higher than 20 feet from the ground surface). Specific ground water information does not exist for the potential sites, and a detailed engineering analysis will have to be performed (including the drilling of test wells) before a specific site is chosen.

The hydrologic conditions in Millard County have been described in two U.S. Geological Survey water supply papers[1] and the hydrologic section of the M-X Environmental Technical report. The area under consideration for this report is composed of the Sevier Desert (roughly West Millard) and Pavant Valley (roughly East Millard).

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[1] Source: References 11 and 13.

Sevier Desert

The Sevier Desert area's groundwater reservoir is composed of clay, silt and sand, creating a multiaquifer system in the valley fill deposits. This system is more than 1,000 feet thick and extends from the Canyon Mountains to the east to Sevier Lake. Two artesian aquifers are present, separated by 300 to 500 feet of relatively impermeable clay, silt and fine sand.

Large alluvial fans extend from the mountain front to the basin. Most recharge to groundwater is from water entering these fans as percolation from streams, irrigation ditches, irrigated fields and the Central Utah Canal. Due to heavy withdrawal, water levels in the area have declined 4 to 7 feet since 1950, and the area of artesian flow has decreased. As mentioned previously, a shallow water table exists, primarily in the Delta area where depth to groundwater is less than 10 feet. Shallow groundwater movement is controlled by local topography and soil cover, while the deep groundwater gradient slopes to the southwest (toward Sevier Lake). Culinary water is obtained from the artesian aquifers.

Pavant Valley

The principle aquifers of the Pavant Valley are sand and gravel deposits of the valley fill, similar to the Sevier Desert area to the northwest. These deposits are coarser, more extensive and more permeable near the mountains, where recharge occurs. Clay confining beds cause artesian conditions to exist in the lower part of the valley. As many as 12 saturated beds of sand and gravel have been encountered to a depth of 800 feet, but the beds constitute a single aquifer. Recharge occurs on alluvial fans from streams, irrigation ditches and irrigated fields. In the northern one half of the valley the Central Utah Canal is a major source of recharge. Water from this aquifer which is not drawn through wells is discharged at the land surface (in springs and seeps in the lowest part of the valley) or into basalt flows along the western portion of the valley. The basalt aquifers are relatively thin (30 to 60 feet) and, when fractured, are capable of storing large quantities of water.

Increased ground water use for irrigation purposes has caused a general decline in water levels. In the bottomlands of the valley, the water table is at or near the land surface. Springs in nearby canyons are tapped as a source of municipal drinking water. Artesian wells are used for municipal, domestic, stock and irrigation water.

Ground water data for wells within a two-mile radius of the potential sites are summarized in Table 9, and can be used for comparison. These data do not represent the groundwater conditions at each of the sites, and were not used to evaluate the ground water impact at the sites. Depth to the seasonal high water table (a shallow aquifer present in some parts of the County, which has been created by irrigation) is not incorporated in well data. Soils information for part of the County mentions the presence of the shallow water table, and lists soils which are not suitable for landfill purposes due to the shallow seasonal water table depth. These areas were avoided when choosing potential sites.

In locating a sanitary landfill site, areas of ground water recharge should be avoided if sufficient precipitation exists to create landfill leachate, which could cause ground water contamination. Areas of discharge (e.g., the bottomlands of Pavant Valley) must be avoided, as the landfill should not come into contact with ground water or surface water.

Surface Water Impact

Leachate production could lead to the pollution of surface water bodies, and landfills must be located such that direct contact with surface water does not occur. If sites are located in or near ephemeral or intermittent drainages, protection measures such as diversion ditches, berms or holding ponds may be necessary.

Soil

Soil depth is an important consideration in selecting appropriate landfilling techniques and determining whether an adequate amount of cover material exists for the operation. Soil type is also a factor, although a wide range of soil types is useable for daily cover. Figure 4 depicts in general terms the suitability of various types of soil for cover material, illustrating the lesser suitability of clean sand or gravel, or clay, for landfill cover material. Fine, dune sand, abundant in the County, was avoided when choosing sites. Cover

TABLE 9

AVAILABLE GROUND WATER INFORMATION

MILLARD COUNTY, UTAH[1]

Potential Site	Nearest Well Location[2]	Well Depth (ft)	Depth to Water (ft)	Well Elevation (ft)	Site Elevation (ft)	Proximity of Well to Site
1	T. 21 S., R. 4 W., Sec. 17, NENW	140	-70	5,010	5,280	1 mi.
1	Sec. 17, SESW	222	-71.2	5,058	5,280	1 mi.
1	Sec. 15, NWSW	150	Dry Well	5,340	5,280	1/4 mi.
2	T. 20 S., R. 4 W., Sec. 11, NENW	110	-35	5,069	5,160	2 mi.
	Sec. 11, SENW	80	-40	5,070	5,160	2 mi.
3	T. 18 S., R. 6 W., Sec. 2, NWNW	246	+11.4	4,593	4,650	2 mi.
4	T. 17 S., R. 6 W., Sec. 22, SWSE	Unknown	+6.6	4,607	4,660	1 mi.
	Sec. 26, NESE	35	-18.5	4,634	4,660	1 mi.
	Sec. 26, NESE	720	-14.0	4,634	4,660	1 mi.
5	T. 16 S., R. 5 W., Sec. 18, NESW	935	-11.4	4,672	4,720	3/4 mi.
	Sec. 19, NWSW	830	-14.7	4,672	4,720	1/4 mi.

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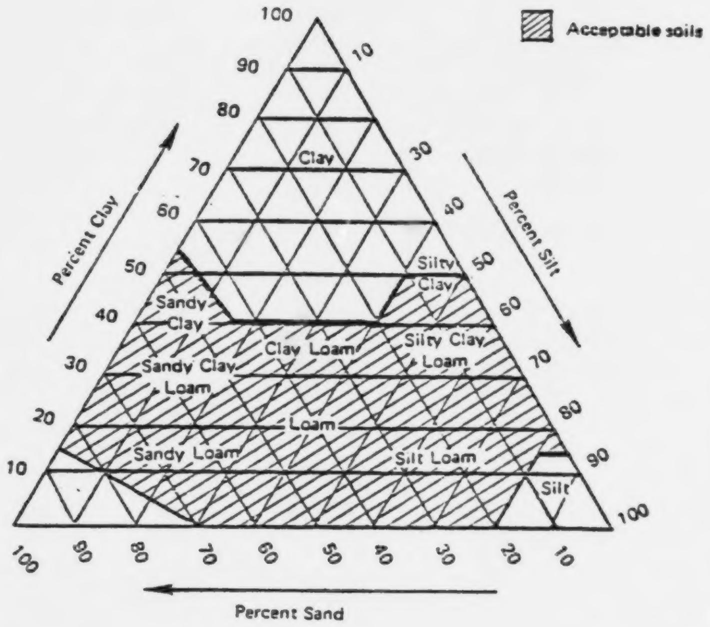
[1] Source: References 9 and 11.

[2] Well locations are described by township (T), Range (R), Section (1-36), and quarter-quarter section (NWSW).

FIGURE 4

SUITABILITY OF SOILS FOR LANDFILL OPERATION



Acceptable soils
Percent Clay
Percent Silt
Percent Sand
100
90
80
70
60
50
40
30
20
10
Clay
Silty Clay
Sandy Clay
Clay Loam
Silty Clay Loam
Sandy Clay Loam
Loam
Sandy Loam
Silt Loam
Silt

Suitability of General Soil Types as Cover Material.[a]

Function	Clean gravel	Clayey–silty gravel	Clean sand	Clayey–silty sand	Silt	Clay
Prevent rodents from burrowing or tunneling	G	F–G	G	P	P	P
Keep flies from emerging	P	F	P	G	G	E[b]
Minimize moisture entering fill	P	F–G	P	G–E	G–E	E[b]
Minimize landfill gas venting through cover	P	F–G	P	G–E	G–E	E[b]
Provide pleasing appearance and control blowing paper	E	E	E	E	E	E
Grow vegetation	P	G	P–F	E	G–E	F–G
Be permeable for venting decomposition gas[c]	E	P	G	P	P	P

[a] E–excellent; G–good; F–fair; P–poor.

[b] Except when cracks extend through the entire cover.

[c] Only if well drained.

Source: Brunner, Dirk R. and Danial J. Keller,
Sanitary Landfill Design and Operation.
U.S. Environmental Agency, Report, SW-65ts, 1971.

material can be transported to the site if inadequate cover material is present, but this alternative is more costly. In this discussion, the term soil refers not only to the actual surficial soil horizons, but to any unconsolidated rippable weathered rock or bedrock material.

It is estimated that approximately three feet of soil will be needed for landfill operations; six inches per landfill cell for daily soil cover (for vector, fire, litter, and moisture control), and two feet for final cover. Final cover serves basically the same functions as intermediate cover, but it must also support vegetative growth. Before a specific site is selected, a site specific soil survey, including soil borings, will be necessary. The regional SCS office will drill to a depth of five feet, if requested by the County or a municipality, and SCS personnel would be present to look at cores if deeper water wells are drilled on prospective sites to determine the water table depth. Also, the Bureau of Land Management will drill soil samples to a depth of 10 feet, when evaluating potential landfill sites on land it administers.

Soil surveys have been performed for the East Millard and Delta Areas[1]. Soil descriptions for the Delta Area indicate depth to the seasonal high water table, and were used to choose areas where ground water depth was not extremely shallow. Engineering suitability properties for sanitary landfilling are also listed in the Delta survey, and areas with a severe limitation for landfill use, due to cobbly or clayey texture or extremely rapid permeability, could be detected. This information was not available for the East Millard Area soil survey, published in 1959. The East Millard Area is currently being resurveyed by the SCS. Specific soil properties will be detailed in the site description section.

Availability

Land use in Millard County has been summarized in Chapter I. The high percentage of land controlled by the Bureau of Land Management (BLM) makes the option of using Federal land feasible. Land may be leased for 20 to 30 years at a very low annual rate per acre, or for no charge, through the Recreation and Public Purposes Act (RPPA). Applicants must identify sites, and an Environmental Analysis must be performed by the Federal government, which usually requires about 6 months. The applicant (e.g., Millard County) must submit all the information that EPA regulations specify, including an operational plan and compliance plan. The area and district offices of the BLM were contacted regarding the use of public land in Millard County for landfill purposes, and the response was positive.

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[1] Source: References 15 and 16.

The State of Utah also manages public land in Millard County. Communication with the Utah State Board of Lands and Forestry in Salt Lake City and in Richfield indicate that, due to the availability of Federal and private land in the County, the potential for use or acquisition of State land is minimal.

Similarly, the U.S. Forest Service discourages the use of land under its administration for landfill purposes when private land is available. National Forest land in the County is almost exclusively located on the extreme topography of the Canyon mountains and the Pavant Range.

In summary, State and Forest Service land will be assigned a low priority when selecting landfill sites, due to the difficulty of obtaining it. Land management by the BLM is the optimum choice due to the cost savings in leasing public land rather than buying private land.

Haul Distance

A separate facility for each incorporated area in Millard County, which meets Federal and State standards, would be extremely expensive. Transportation of waste to regional landfills is therefore a necessity. If one regional landfill is used, the optimal choice is a site which minimizes total haul distance. If two landfills are utilized, the greatest cost savings will be realized if each landfill is located closest to the major centroids of waste generation (the Cities of Delta and Fillmore).

Area

Sizing of landfill sites will depend upon how many disposal sites are used. If more than one site is used, each site can be smaller than if one County-wide site is implemented. In general, larger sites lend more flexibility to landfill operations by including room for a buffer zone and future expansion. A larger size also increases the generation for on-site cover procurement and allows for a more shallow fill depth (if, e.g., the water table is relatively high). Average County-wide waste generation until the year 2000 will require approximately 3 acres per year for disposal for the base growth scenario, and 4 acres per year for the high growth scenario, assuming a trench-type operation[1]. Theoretically, 55 or 75 total acres would be necessary for waste disposal for the 19-year study period.

Access

Areas which are located less than one mile from an improved, all-weather road will be considered exclusively, due to the prohibitive cost of road construction. Currently, it costs approximately $60,000 per mile[2] to build an improved dirt road in the study area.

Compatibility with Master Plans

City comprehensive development plans for most incorporated areas have been issued in draft form at present. The County-wide plan for unincorporated areas is currently being prepared. These plans address land use planning, zoning powers, and such public services as law enforcement, fire protection, and solid waste management. Generally, the plans establish the goal of providing facilities and services for solid waste disposal, including periodic waste collection. The city comprehensive plans expressed municipal interest in discussing the feasibility of developing joint solid waste disposal sites to be cooperatively managed and utilized by Millard County, other municipalities, the BLM, etc.

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[1] A 15-foot deep trench with a 22-foot base and 1:1 sidewalls was assumed for this calculation.

[2] Source: Reference 9.

Zoning

Millard County issued a zoning map in 1969 which zoned unincorporated areas only. Zones are either agricultural (A-1) or open range and forest (RF-1). Both of these zones may be used for landfilling. A conditional use permit must be approved for use of land zoned agricultural. Open Range and Forest land use must be approved by the Planning Commission. A new zoning map for the County will be available in the near future.

Other Environmental Constraints

The Resource Conservation and Recovery Act states that waste management practices should not have an adverse impact on prime agricultural land, critical habitat for threatened or endangered species, archeological or historic artifacts or geothermal resources. Before choosing a particular site, Millard County should perform a more detailed analysis of these factors. However, the five potential sites do not appear to adversely affect these parameters.

Another concern is location of a site outside of a 5,000 to 10,000-foot radius of nearby airports. Landfills present a dust and bird hazard to aircrafts utilizing the airport. The 10,000-foot limit is a recommended Federal guideline for airports used by turbo-jet aircraft. A 5,000-foot limit is recommended for airports used only by piston-type aircraft. A public airport, which currently serves only piston-type aircraft, is located 4-1/2 miles northeast of Delta.

C. Site Descriptions

The following descriptions summarize each of the five sites according to the criteria previously discussed. A summary of each site's advantages and disadvantages for landfill development accompany the general description. Conclusions are made regarding the two most suitable sites.

Site #1 (Fillmore). The present Fillmore disposal site is located 1/2 mile north of Fillmore on Highway 91, and one mile east on an improved dirt road (see Figure 5). The area presently in use is approximately ten acres in size, and 30 additional acres are available to the west. The total of 40 acres is owned by the City of Fillmore.

The predominant soil type is Pavant stony sandy loam, which occurs on alluvial fans adjacent to the Pavant Mountains, and on steep slopes between entrenched drainageways. According to the East Millard County Soil Survey[1], the soil is not suited for cultivation, due to the presence of stones, and is poor for grazing. A thick layer of lime hardpan may be present below the surface layer, which would make excavation difficult. Internal drainage through hardpan is very slow, except through cracks. It must be emphasized that soil borings will be necessary before engineering decisions can be made regarding the depth and suitability of the soils. However, surface soils appear to be usable for daily cover. The slope of the site averages about five percent.

Located in an intermittent drainage, the site would require ditches to divert runoff from reaching the waste and causing possible leachate production. Ground water data are displayed in Table 9. The nearest wells, located west of the site, indicate a water depth 60-70 feet. Water wells must be drilled on the chosen site or sites in order to determine the depth to groundwater.

Vegetation at the site is primarily bunchgrasses, with some trees. No homes are in close proximity. The disposal site is highly visible from the dirt road which services it, but is not visible from Highway 91.

A major advantage of using this site is its current status as a disposal site, which should cause a lesser land use conflict than designation of a new site. It also minimizes haul distance to Fillmore and is the most centrally

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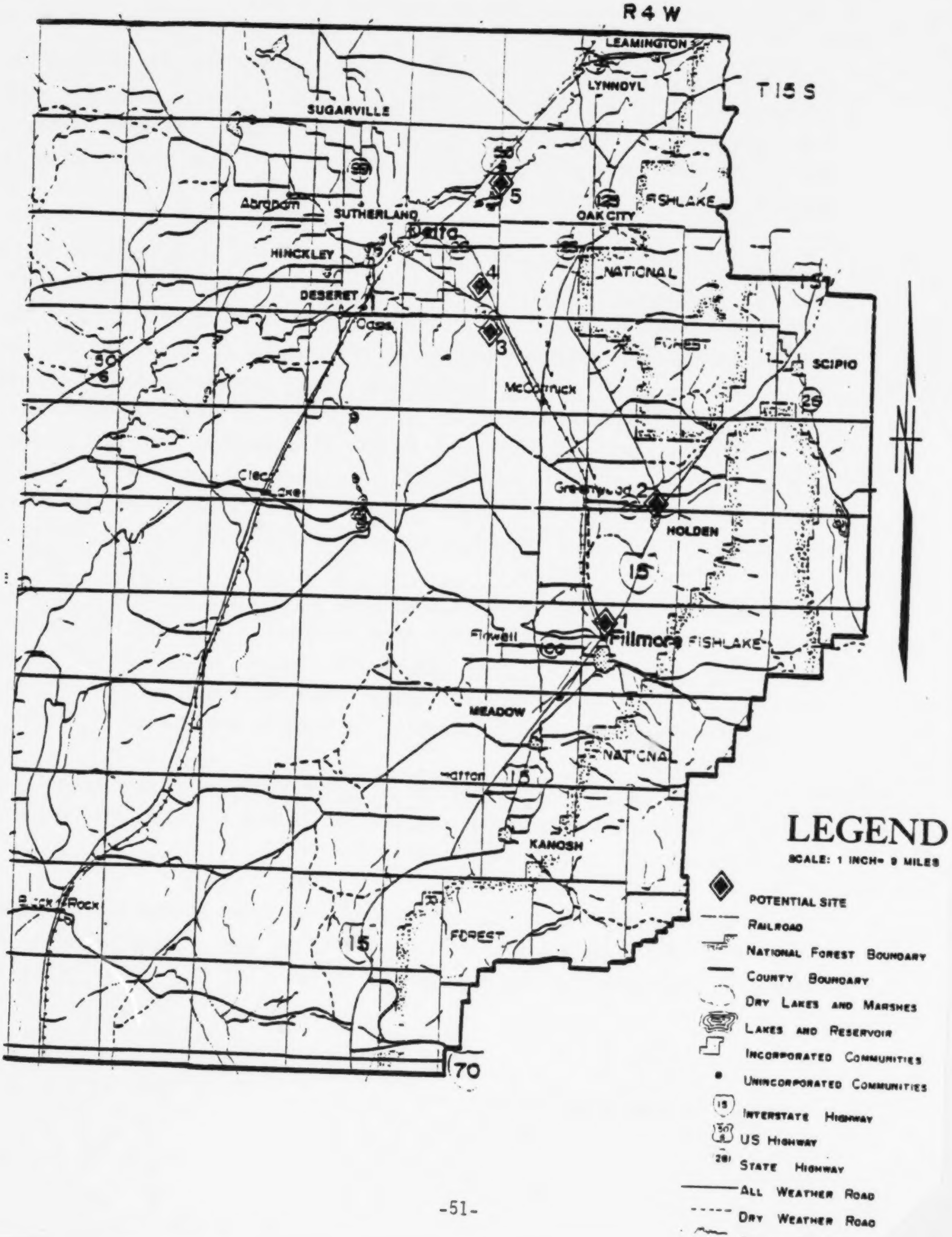
[1] Source: Reference 16.

Figure 5
POTENTIAL SANITARY LANDFILL SITES
Millard County, Utah


R 4 W
T 15 S
LEAMINGTON
LYNNDYL
SUGARVILLE
50
6
5
Abraham
SUTHERLAND
OAK CITY
125
FISHLAKE
Delta
26
HINCKLEY
DESERET
4
NATIONAL
Oasis
3
FOREST
SCIPIO
26
50
6
McCormick
Clear Lake
Greenwood 2
HOLDEN
15
1
Flowell
100
Fillmore
FISHLAKE
MEADOW
NATIONAL
Hatton
15
KANOSH
Black Rock
15
FOREST
70
N
LEGEND
SCALE: 1 INCH= 9 MILES
POTENTIAL SITE
RAILROAD
NATIONAL FOREST BOUNDARY
COUNTY BOUNDARY
DRY LAKES AND MARSHES
LAKES AND RESERVOIR
INCORPORATED COMMUNITIES
UNINCORPORATED COMMUNITIES
15
INTERSTATE HIGHWAY
50
6
US HIGHWAY
26
STATE HIGHWAY
ALL WEATHER ROAD
DRY WEATHER ROAD
ANNUAL STREAMS

located site in relation to incorporated areas in East Millard County. One possible constraint to consider is future land use and zoning. The site currently has a one-half-mile radius of land zoned as agricultural around it. This agricultural land serves as a buffer zone to the land one half mile to the west, which has been zoned as residential.

Communication with Fillmore authorities and County sources indicates that residential and business growth is projected to occur north of Fillmore, near Interstate 15, and growth in that area should not present a conflict with operation of a landfill at the present site. It should be noted that previous operation of the site has been perceived as a nuisance by Fillmore residents, due to burning of waste. However, proper sanitary landfill operation would eliminate burning.

Site #2 (Holden). Located approximately one mile north of Holden on an improved gravel road off of Highway 26, this 80 acre parcel of public land administered by the BLM is just north of the present town disposal site (see Figure 5). The site is about 11 miles north of Fillmore, and about 28 miles southeast of Delta.

The soil type is Pharo loam, which is located on old alluvial fans and lake terraces. The East Millard County Soil Survey notes that this soil is generally excessively well drained, which would present problems if precipitation were high enough to cause leachate production. Ditches and berms could be used to contain precipitation and divert runoff. The soil is typified by medium amounts of organics, calcium carbonate, and gravel. On the eastern and northeastern edges of the area, Ebbs loam (a silty loam) is present. These soils have been examined to a depth of five to six feet, and more soil information would be necessary if the site were to be used. The slope of the area is 0-2 percent.

An intermittent drainage transects the northwest corner of the parcel. The nearest perennial drainage, Church Spring, is one mile to the north. Groundwater data near the site are not available. Wells located two miles to the south indicate a ground water depth of 35-40 feet (see Table 9).

Vegetation is primarily sagebrush and scattered bunchgrasses. A residence is located about one mile to the north. Adjacent land is used for farming, while the potential site is currently used for grazing. The site is very visible from the improved gravel road bisecting it. The area is currently zoned as agricultural.

This site is relatively large and could serve as an East Millard landfill site, as it is fairly centrally located. Ground water contamination could be a problem at the site, due to the combination of a possible high water table and excessivley well drained soils. Use of the site would depend on ground water and soil testing.

Site #3 (Harding). Another 80 acre plot of land administered by the Bureau of Land Management, this site is southwest of the junction of highways 140 and 26, at Harding (see Figure 5). Delta is nine miles to the northwest, while Fillmore is 30 miles southeast. This site could serve as a single county landfill site, if that disposal option is chosen.

Soils at the site are Escalante loam and Escalante sandy loam, which occur on former lake terraces. Below a depth of 40 inches, the substratum contains a white, calcareous lake deposit which is fairly impermeable unless cracks are present. Wind erosion may be a problem, due to the low percentage of organics in the loams. The slope of the area is 0-2 percent.

Surface water contamination does not appear likely. An intermittent drainage is located 3/4 mile to the north, and the Central Utah Canal is 2 1/2 miles to the east. The closest perennial drainage is 2 miles to the west.

Very little ground water data exist for the area. The nearest well is a 246-foot deep flowing artesian well located two miles northeast of the site, recording a water depth of + 11.4 feet. This water level indicates that the aquifer is confined and under a positive hydrostatic pressure.

Vegetation at the site is sagebrush, scattered greasewood, shadscale and Russian thistle. The area is visible from Highways 140 and 26. No residences are located within a mile. Utility lines follow Highway 140 south of the site, but do not appear to cross the potential landfill site. The site is zoned for open range and forest and is currently used for grazing.

This site could most optimally be utilized as a regional (County-wide) site, due to its location between Delta and Fillmore. However, it is 80 acres in size, and average County-wide waste generation for the twenty year study period, would require a 55 - 75 acre site, depending on which growth scenario is assumed.

Site #4 (Southeast Delta). This potential landfill site is located approximately six miles southeast of Delta along Highway 26 (See Figure 5). The area under consideration is about 80 acres of public (BLM) land adjacent to the west side of the highway. Additional land should be available to the west, south, and east.

The Delta Area Soil Survey[1] describes soils at the site as Uvada silt loam, which is silty loam, silty clay, and silty clay loam to a depth of five feet. Permeability is very slow. Runoff is slow, and erosion hazards are slight. The slope is 0-2 percent.

The area drains into a perennial drainage one mile to the southeast. Diversion ditches would prevent runoff from reaching waste disposal areas. Available well data are listed in Table 9. The ground water table in this area could be as high as 20 to 40 feet below the land surface. Test wells would be necessary to determine this.

Shadscale and greasewood are the primary vegetative types. This site is very visible from Highway 26, although the slope is to the southwest. A residence is located about one mile south of the area. The land is presently used for grazing purposes, and is zoned as open range and forest.

This site is the largest of the sites reviewed. Although 80 initial acres have been designated for use, additional public land is adjacent. This site is one of the two sites which could contain the total County waste for the high growth scenario. A further advantage, in use of the site as a regional landfill, is its relatively central location. Soils appear to be favorable, but ground water level may be high.

Site #5 (Northeast Delta). The final site under consideration is approximately 6 1/2 miles northeast of Delta on Highway 6, and about one mile east on an improved gravel road. The area contains numerous excavated pits, due to gravel mining by the Utah State Road Commission and Millard county. The property is managed by the BLM. At least 80 acres would be useable for landfilling, although only five to ten acres have been excavated (to a depth 5-10 feet).

The Delta Area Soil Survey indicates that the soil in the area is Yenrab fine sand, which is a well-sorted, dune-producing sand. This soil would be unusable for cover, as it is easily windblown. It is also extremely permeable, which contributes to contamination of groundwater, if leachate is formed. However, "included with this soil in mapping are small areas of Uvada silt loam and Yenrab sand loam... Also included is a soil that is similar to this Yenrab soil, but it has a strong lime layer, and in places it contains a little gravel." Field investigation revealed that the soils present at the site appear to match this description. the East Millard Areas Soil Survey, an older report which overlaps the Delta Area Survey in coverage, mapped the soils at the site as Lynndyl loam and Oasis loam. The two loams are quite similar, except that the Lynndyl loam has a porous gravelly substratum beginning at about two feet, and lime carbonate is present in the subsoil. Field investigations determined that the soil below the gravel layer, at a depth of 5-10 feet, appears to be a silty clay loam. This silt is workable for trenching and suitable for daily cover, particularly if the loam is mixed with gravel. If the loam is continuous, and gravel is not present below the site, infiltration of precipitation, production of leachate, and contamination of groundwater or the Sevier River would be less likely. Again, soil borings would be necessary. This site would make use of the extensive amount of earthwork already performed by gravel excavation. Waste could be disposed of in the worked-out pits, and gravel mining and landfilling could occur cooperatively. Slope at the site is 0-5 per cent where the land if undisturbed, and 0-2 percent in the excavated areas.

The site is only 1/8 to 1/4 mile from the Sevier River. Although the river flows in a fairly deep channel and several irrigation dams are located upstream, the site could be located in the river's flood plain. No flood plain areas have been designated in Millard County. The area drains into the river, and diversion ditches and a holding pond for runoff control would be needed. Depth to the water table in the area is unknown, and water wells at the site would be needed to make that determination. The nearest wells are very deep artesian wells, recording depths of 15 to 25 feet (see Table 9). The ground water table near the river could be mounded. This would increase the potential for groundwater contamination because leachate, if produced, would be closer to contact with the water table.

Vegetation at the site is sagebrush, Russian thistle, and shadscale. The area would be partially visible from Highway 6. This area is also zoned as open range and forest land.

Site #5 would serve as a convenient West Millard site, due to its location. It is a large site, which could contain the total County waste for the next 20 years, but its extreme northern location in the County makes it less convenient for use as a regional site. Prior excavations at the site resulting from the gravel mining might provide cost savings in landfilling. However, possible surface and ground water impacts associated with the site's lateral proximity to the Sevier River and possible permeable underlying soils (gravel and sand) appear to outweigh the economic advantages of using this site.

In conclusion, the sites which appear to offer the most benefits and least constraints for landfill use are site #1 (Fillmore) and #4 (Southeast Delta). Site #1 will be considered for use as an East Millard site only, while site #4 could be used as a County-wide or West Millard landfill. These sites were used in developing cost estimates in Chapter V. Sites #2, #3, and #5 can serve as alternate sites, in the event that the recommended sites are unsuitable due to currently unidentified soil or ground water problems.

V. SOLID WASTE MANAGEMENT ALTERNATIVES

Basic collection and disposal alternatives will be outlined, in order to develop a solid waste management plan. Initially, collection alternatives will be compared, with a description of each system's general costs, equipment needs, and suitability for Millard County. The type of waste disposal to be employed in Millard County is landfilling. Therefore, the disposal alternatives are established by the number of landfills and/or bulky waste disposal sites to be used. The conclusions regarding potential landfill sites, developed in Chapter IV, serve as a basis for identifying disposal alternatives. Collection and disposal alternatives are interdependent, and the recommended waste management plan will encompass the most appropriate combination.

A. General Collection and Transportation Alternatives

The principle types of collection in use are house-to-house service, small containerized systems, and transfer stations.

House-to-House Service. This type of collection in rural areas or small communities usually involves the servicing of storage containers once weekly, in the alley, back yard, curbside, or next to the mailbox.

The most commonly used vehicles for house-to-house collection are side-loading and rear-loading compaction trucks (see Figure 6) with capacities of 10- to 30 yd^3. The type and size of vehicle needed depends on terrain, road and bridge conditions, haul distance, and the amount and type of waste to be collected. The advantage of house-to-house collection is that it provides a high level of scheduled service to rural and city residents. However, costs are usually higher than those for small container systems or transfer stations. A small, dispersed population often cannot support such a method. Estimates of the number of collections needed to support this type of service range from 200 to 250 per day[1]. Service may be difficult for isolated areas, or during bad

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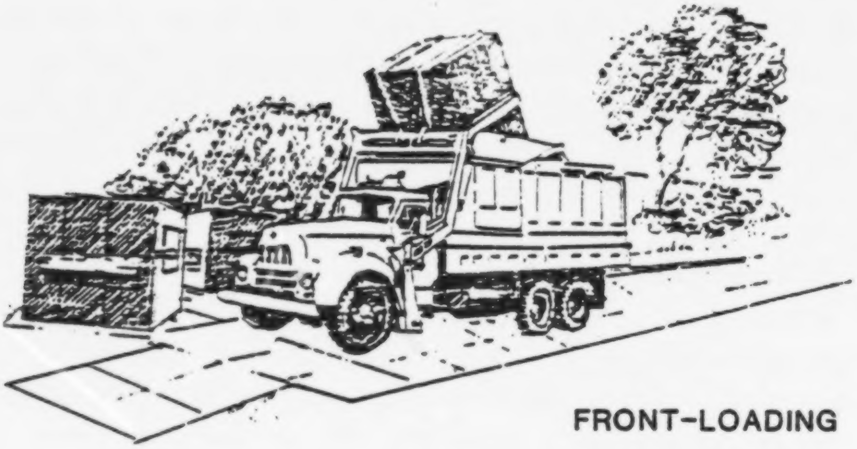
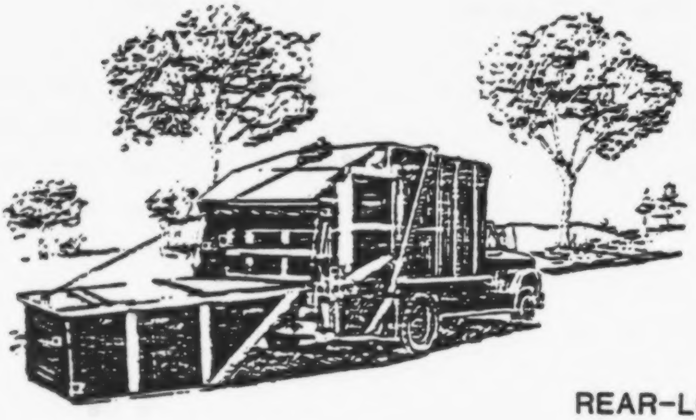
[1] Source: Reference 7.

FIGURE 6

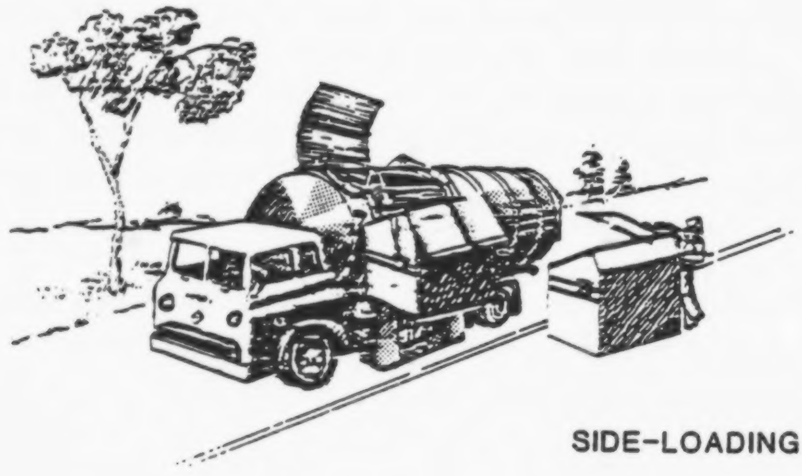
FRONT-, REAR-, AND SIDE-LOADING GREENBOX COLLECTION VEHICLES



FRONT-LOADING



REAR-LOADING



SIDE-LOADING

weather. Also, only limited types and amounts of bulky wastes can be collected without a special collection crew.

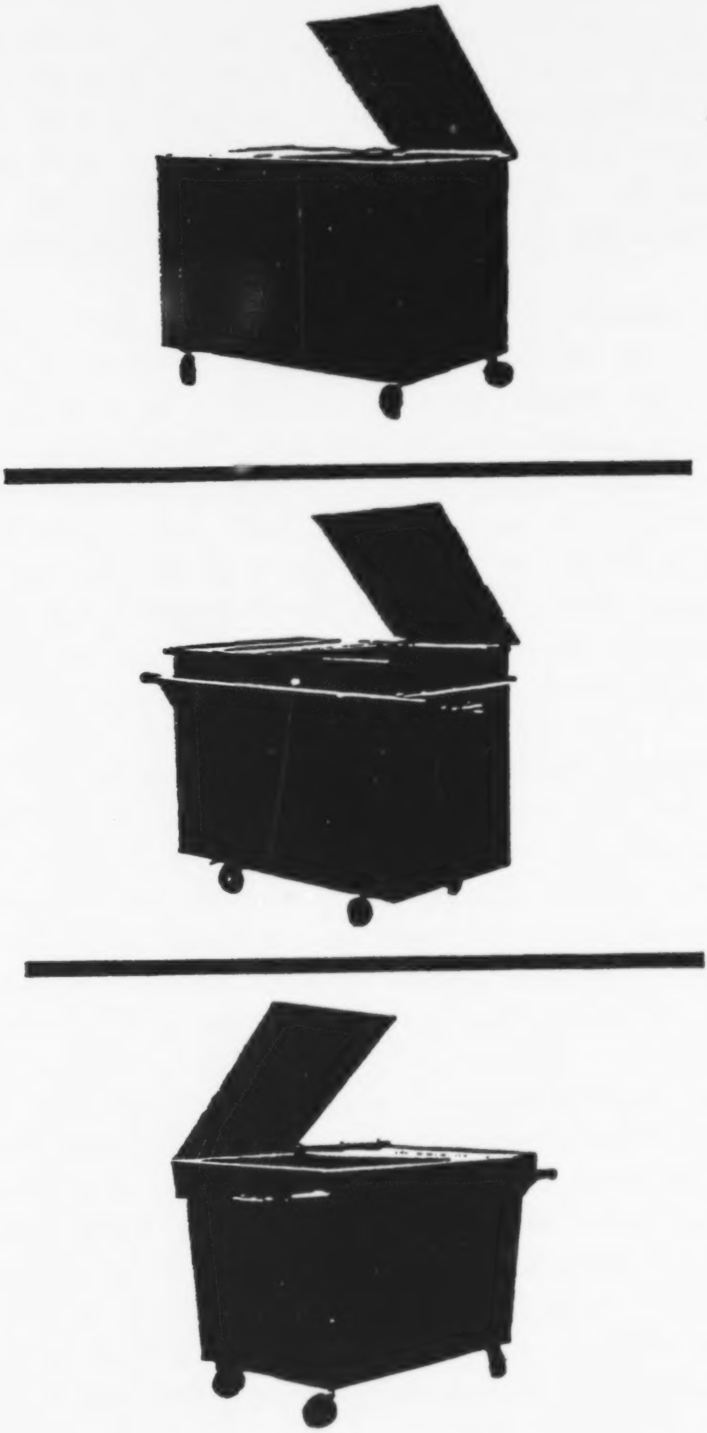
Due to the relatively small, dispersed population of Millard County, the house-to-house collection alternative for both rural and incorporated areas does not appear to be economically feasible. It is assumed that private house-to-house collection in the incorporated areas presently serviced (Delta and Fillmore) will continue, and this type of collection will not be analyzed further.

Small Containerized System. In rural areas and communities with populations less than approximately 1,000, where no individual house-to-house collection service is available, a potentially economical alternative is the use of containers strategically placed throughout the service area. The containers, often called "greenboxes", range from one to ten cubic yards in size (see Figure 7) and are emptied into front, side, or rear-loading compacting vehicles. Waste may then be disposed of at the nearest landfill, or at a central transfer station to await final transportation and disposal at a regional disposal site. Containers are located at convenient locations where suitable land is available. An objective is to site containers no further from consumers than the previous drive to a dump site. Examples of locations would be in or near small communities, at major road intersections, at previous dump sites, schools, commercial establishments, and parks and recreation areas.

A major advantage of this system is the flexibility of the containers to adjust to changes in population size and distribution by changing the number of containers and moving site locations. This is vital in Millard County, which will experience large population fluctuations. In addition, containers may replace many small indiscriminant open dumps, allowing for economical waste disposal at a regional site which is in compliance with all local, State, and Federal laws. The expenses involved in developing container sites are relatively low. This type of system would provide an equal or higher level of service than the present predominant disposal method in Millard County (private individuals hauling to local disposal sites).

A disadvantage of the system is the initial high equipment investment. Maintenance of sites is necessary, and containers are often abused, lowering

FIGURE 7. GREENBOXES



SOURCE: GEORGE SWANSON & SON, INC., ARVADA, COLORADO their effective life. User charges cannot be utilized, except for commercial services, unless an attendant is present to collect fees. Residents with no means of transportation have difficulty using the containers. Also, existing house-to-house collection in the area of container sites could be decreased. A major consideration concerning small containers is that limited types and amounts of bulky wastes can be collected. Containers cannot accept burned or burning materials, industrial waste, bulky waste (appliances, furniture, demolition and construction debris, tree trunks, etc.) or dead animals.

As mentioned previously, the types of vehicles used in small container collection are front, side and rear-loading compaction trucks. Front-loading vehicles utilize the minimum crew size (one person) and have the fastest servicing time. However, front-loaders can rarely be used for house-to-house collection, due to space restrictions in alleys. Side and rear-loaders are more versatile in performing house-to-house as well as small container collection. The side-loading system is the most recent innovation of the three types, and it affords the best compaction and is generally lighter in weight than the other vehicles. It also requires a one-person crew. These advantages led to the assumption of use of the side-loading system, in costing waste collection options.

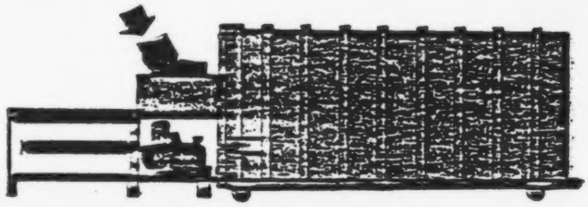
Transfer Stations. Another collection alternative for Millard County is the use of roll-off containers (16 to 60 yd.^{3}) or transfer trailers (50 to 75 yd.^{3}) at centrally located sites. Figures 8 and 9 illustrate these systems, respectively. Transfer stations, utilizing roll-off containers or a transfer trailer, are used to provide shorter haul distances for commercial waste collection vehicles, or serve as central locations for rural residents who haul their own waste to the site. Waste is then transported to a regional disposal site.

Transfer stations are commonly designed to function in one of two ways. One method is direct transfer (direct dump) of the wastes from the collection vehicles to the large capacity transfer containers. The second method (stockpile/front-end-load) consists of stockpiling the wastes from the collection vehicles and periodically moving the stockpiled wastes into the transfer vehicle. Generally, in cases involving small daily waste loads on the order of 50 tons per day (TPD) or less, direct transfer of the wastes is the most cost-effective alternative. Millard County currently generates a total of 40 tons of

FIGURE 8.

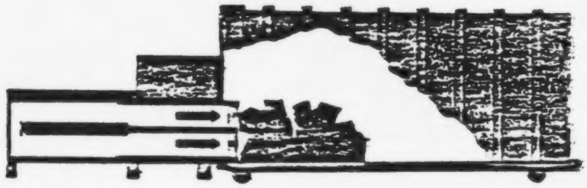
TILT FRAME/ROLL-OFF TRANSFER VEHICLE

1.



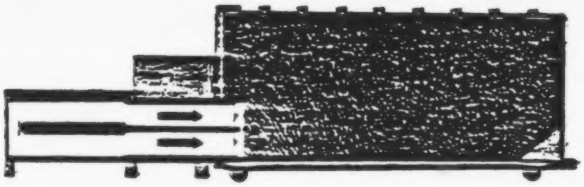
1. Refuse is inserted into the compactor hopper by various methods. Loading procedure can be selected to best suit each installation.

2.



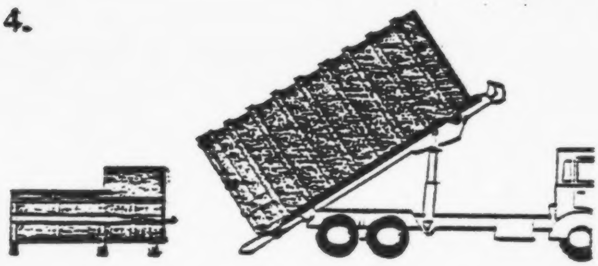
2. Simply activate pushbutton control and your trash is compacted and stored in a sanitary, closed system.

3.



3. High compaction forces allow large volumes of refuse to be stored in the smallest space.

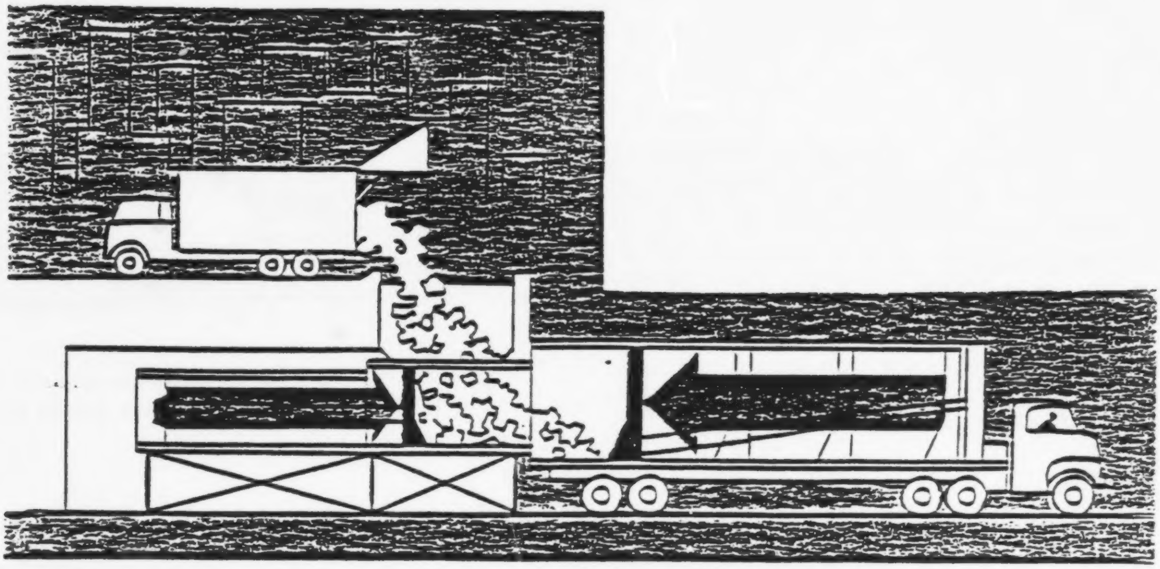
4.



4. Your trash is removed by a roll-off truck when your receiving container is full and your system is ready for work again.

SOURCE: DEMPSTER DUMPSTER SYSTEMS, KNOXVILLE, TENNESSEE

FIGURE 9. TRANSFER TRAILER VEHICLE



SOURCE: DEMPSTER DUMPSTER SYSTEMS, KNOXVILLE , TENNESSEE waste per day, and subsequent cost estimates reflect the use of the direct dump transfer method. In 1987, that figure is projected to reach 60 to 100 tons per day, depending on the growth scenario assumed. Larger volume transfer stations (50 to 250 TPD) usually utilize the stockpile method plus sophisticated transfer equipment. Additionally, transfer stations of this size have the potential to implement limited resource recovery operations (e.g. paper and aluminum can separation and recycling) to offset capital and operating costs. Transfer stations with various arrangements of optional equipment are commercially available from a number of nationwide manufacturers, some of whom offer turn-key services.

Compaction Unit. In general, for areas where populations exceed 1,000 or where transportation distances exceed approximately 15 miles, it is most economical and practical to have the transfer station equipped with a compaction unit to reduce the volume of the waste. This allows for a substantial increase in the quantity of waste which can be transported each trip and thus decreases the number of vehicle trips taken to the ultimate disposal site.

Transfer Vehicles. As mentioned previously, there are two types of transfer vehicles which can be used with compaction equipment. These are the tilt frame/roll-off container vehicle, and the transfer trailer.

The tilt frame/roll-off is so named because of the moveable rail structure which is mounted directly on the truck chassis or separately on a trailer bed (see Figure 8). A roll-off container is collected by "tilting" the rails and winching the entire container onto the structure. When the container is to be emptied, the rear doors of the container are opened and the entire package is tilted so that the compacted refuse falls out. Commercially available tilt frame/roll-off transfer vehicles may be equipped with a separate refuse compactor. Refuse is deposited in a hopper feeding the compactor which forces the waste into the roll-off container. There is little compaction of refuse until the container is nearly full, since only then does the compactor exert a significant pressure. A typical ratio of compacted to loose refuse density achievable by this type of system is 1.9 to 1 by weight.

In contrast to the external compactor associated with the tilt frame/roll-off type of trailer, the transfer trailer has a hydraulic ejection ram mounted inside the trailer compartment (see Figure 9). When emptying the trailer, the rear doors are opened and refuse is pushed out by the ram. This ram provides a significant advantage for the transfer trailer to achieve a much higher density of wastes in one of two ways. If a separate compactor is utilized, it can work against the ejection ram which is extended at first and gradually retracted as the volume of contained wastes increases. Alternatively, the ejection ram can be used as a compaction device. In this system, wastes are introduced via a hopper into a "top dumping" trailer just behind the face of the ram. When a certain volume has been deposited, the operator can use the ram to compact the wastes against the rear door of the trailer. The advantage of this method is that no separate piece of compaction equipment is required. The trailer requires a source of hydraulic pressure which can be provided through a "wet-pack" hookup from the tractor rig or a stationary hydraulic pump (gas or electric). A typical ratio of compacted to loose refuse density achievable by this type of system is 3 to 1 by weight.

Transfer stations have an advantage in their flexibility in handling large fluctuations of generated waste. Bulky wastes can be serviced, but compactable waste should be separated from bulky waste prior to disposal. Disposal fees can be collected, as an operator is usually employed. Some disadvantages are that users often must travel longer distances than small container systems require, and are less convenient. Sites are larger than small container sites, and thus generally more expensive to obtain and maintain. The use of either roll-off containers (with or without stationary compactors) or transfer trailers was determined to be operationally feasible in Millard County. Costs for these collection systems are analyzed in the following sections.

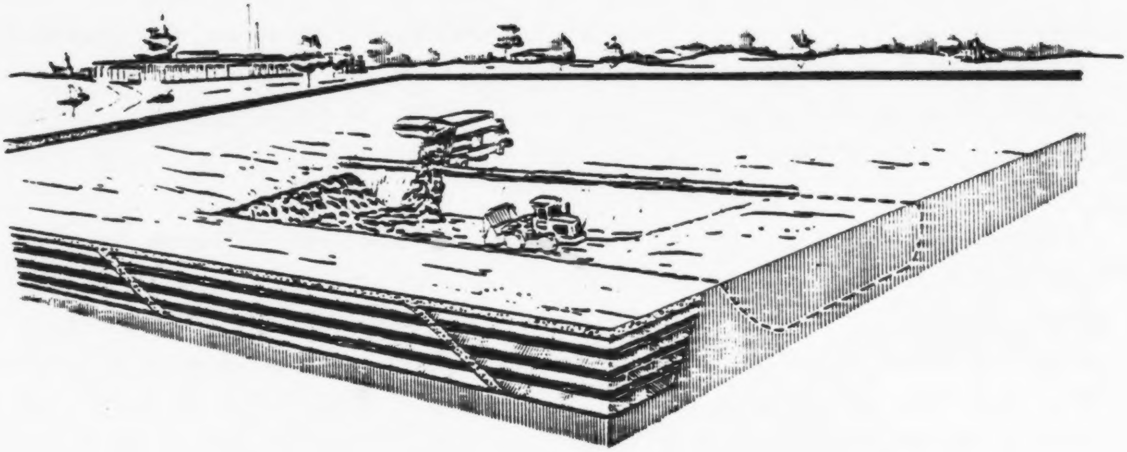
B. General Disposal Alternatives

By definition, sanitary landfilling is an engineered method of disposing of solid waste on land by spreading the waste in thin layers, compacting it to the smallest practical volume and covering the waste each working day[1]. Burning is not allowed at a properly operated sanitary landfill. Appendix D contains a glossary defining sanitary landfilling and other solid waste terms.

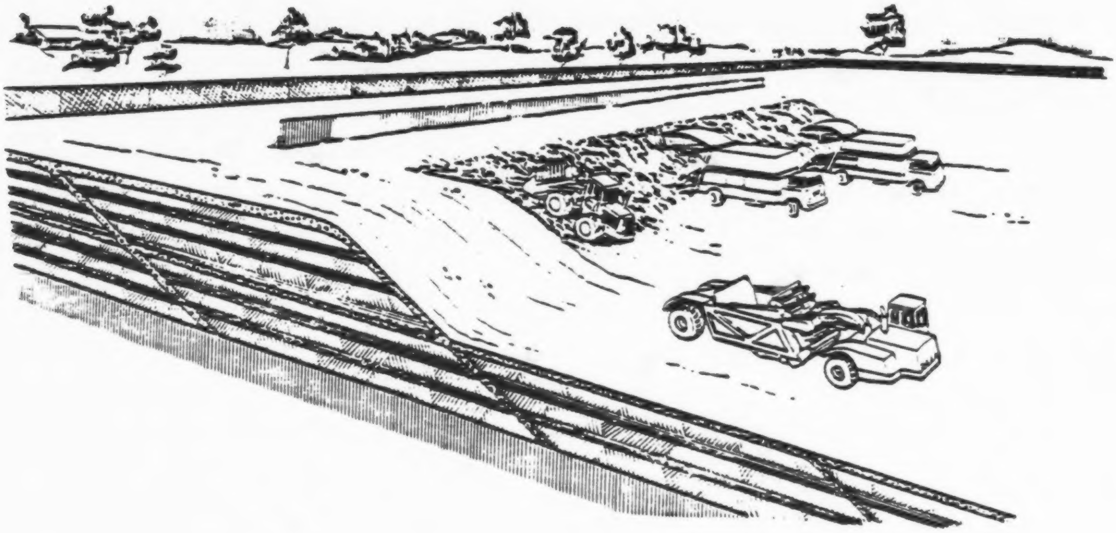
The two basic landfilling methods are the trench method and the area fill method; other approaches are essentially modifications to these two methods (see Figure 10). Basically, the trench method is used in areas where the seasonal

FIGURE 10

TRENCH AND AREA METHODS OF SANITARY LANDFILLING



Trench Method



Area Method

Source: Reference 2

high water table is relatively low and the soil is more than six feet deep. It is best employed on flat or gently rolling land. The area method can be followed on most topographies and is often used if large quantities of solid waste must be disposed of, or if the size of the site is a constraining factor.

Trench Method. Waste is spread and compacted in an excavated trench and cover material, taken from the spoil of the excavation, is spread and compacted over the waste. This method generates a large amount of excess fill, which can be stockpiled on-site, used to improve access roads or to build berms, or used as cover if an area fill is later placed over the trench fill.

Area Method. The area fill method of landfilling, in which waste is applied directly onto the land surface either with or without cover pre-stripping, is a somewhat more difficult methodology to operate efficiently. Larger volumes of trash and daily cover are usually associated with an area landfill. In an area fill, uncovered and exposed trash is more susceptible to being scattered by the wind, which might present a problem in Millard County. Waste sitting on top of the ground is also certainly more visible than waste deposited in a trench. Because of these reasons, the area method will not be recommended unless the life of a site must be extended (e.g., if the high growth scenario occurs.)

Combinations of these two methods are possible, and one common variation is the progressive ramp method, in which waste is spread and compacted on a slope. Cover material is obtained directly in front of the working face. This technique allows for more efficient use of a disposal site than the area method, because a portion of the waste is deposited below ground. As mentioned previously, another combination is the use of an area fill over a site previously trenched.

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1 Source: Reference 1.

C. Millard County Alternatives

Solid waste management systems are composed of a combination of collection and disposal alternatives. The recommended system will be determined by the level of service desired by the public, adequate protection of the environment and public health, a minimization of initial capital costs and annual operating costs, and the system's ability to accommodate changes in population and waste generation rates. In Millard County, the controlling factor in designing a solid waste system was the disposal alternatives available.

Disposal alternatives consist of determining the optimum number of sites which will provide adequate service, protect the environment, and minimize costs for residents. The options outlined below include use of:

1. Separate disposal sites servicing each incorporated area;
2. Two disposal sites, with one location in East Millard County and one in West Millard County, and;
3. One regional site serving the entire county, located between Fillmore and Delta.

The advantages, disadvantages, and general costs for each option are discussed.

The first alternative appears to provide the highest level of service to the public, and would be most compatible with past disposal habits. However, the costs involved in operating a sanitary landfill are much greater than the expenses associated with the existing disposal areas. If each incorporated area were to operate individual sites, no economies of scale would be realized. Equipment, labor, and land costs would be extremely high. Landfills are generally more cost-efficient when larger quantities of waste are handled. An additional problem in recommending individual community sites is the lack of many small, suitable sites in the County. In summary, this option is economically unfeasible, and will not be considered further.

The second disposal alternative is based on the use of two sites, with one landfill in East Millard County and one in West Millard County. The two-landfill option would be most reasonable if the high growth scenario occurs (IPP and MX-related growth), as East Millard County's waste generation would be approximately double that of base growth (IPP only) for that portion of the County.

A third alternative is the use of a single large, regional sanitary landfill, in order to consolidate operations and make full use of landfill economies of scale. This site would most reasonably be located in the Delta area (the major waste generation center), or between Delta and Fillmore, along Highway 26. Transportation costs are minimized by reducing haul distance for the greatest amount of waste possible. A thorough analysis of the cost benefits realized by operating only one site, versus the transportation costs involved in transporting waste a greater distance, has been performed and is presented in the following section.

The landfills determined to be most suitable for Millard County are discussed in detail in Chapter IV. Site #1 is recommended as an East Millard site (for use as a landfill or as a bulky waste disposal site), while site #4 could serve as a regional or as a West Millard sanitary landfill site. Site #1 would utilize the progressive ramp method in order to extend the life of the site and allow for the most efficient disposal of waste in the valley. Site #4 would utilize the trench method, and an area fill could later be used on top of the trench fill. These two methods have been recommended, rather than use of an area fill, to promote more efficient operation of the sites, to control blowing litter, and to minimize aesthetic impacts.

Five specific solid waste options, involving different combinations of collection and disposal, were identified. Costs were developed for each of the five options. The best option for Millard County can then be chosen by comparing both costs and level of service. Options 1, 2, and 3 call for the use of a single, regional sanitary landfill near Delta (potential Site #4) and a bulky waste disposal area at the present Fillmore disposal site (potential Site #1). Options 4 and 5 recommend that both sites (#4 and #1) be used as sanitary landfills, serving West and East Millard, respectively.

A description of each option, its advantages and disadvantages, and component cost summaries are provided in Appendix D (Tables D-1 through D-20). Capital and operating costs[1] have been determined for 1982 and 1987 (assumed to be the peak growth year) for both base and high growth scenarios. Yearly costs should range between these estimates. Initially, 1982 costs were developed. Incremental costs were then developed for 1987 costs, and the two were combined to determine 1987 total costs. Capital costs were amortized at 10 per cent over 10 years, the approximate life of the equipment. Equipment operating costs include maintenance, overhaul, fuel and parts.

Option 1. This option consists of dispersing approximately 600 greenbox containers (Table D-9) throughout the County for collection of all compactable municipal and residential solid waste. A side-loading compactor truck collects the waste at least weekly. Following greenbox pickup, the waste is hauled to a transfer station located at the Fillmore bulky waste disposal site (at the present Fillmore disposal site) or directly to the West Millard landfill. The transfer station consists of a transfer trailer (Table D-11) which compacts solid waste before final transportation of the waste to the West Millard site. A skid loader is required at the transfer station to load the trailer.

Under this option, bulky wastes are collected separately in open-top roll-off containers (Table D-13) located near each of the incorporated communities except Fillmore. Bulky items are privately hauled to these transfer locations. Roll-off containers are hauled weekly, or as necessary, directly to the nearest bulky waste disposal site, either Site #4 and Site #1. In West Millard, Site #4 (Table D-3) will be utilized, while in East Millard, the bulky waste disposal area, Site #1 (Table D-7) will be utilized.

Advantages of this system are the relatively high level of service provided, and the efficiencies achieved by using large, sophisticated equipment. By using the same tractor with the transfer trailer and the roll-off containers, capital costs are reduced. However, this option exhibits high capital and operating costs, and additional capital expenditures will be required when equipment capacity is exceeded. Table 10 presents the costs associated with the system, and Figure 11 illustrates the components. Table 10 breaks down the costs by base growth scenario (IPP-related growth) and high growth (IPP and MX-related growth) for 1982 and 1987.

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[1] Source: References 3, 4, 5, 6 and 9.

Option 2. The second option is very similar to the first. The greenbox/side-loader collection system is utilized, and Site #4 functions as the sole sanitary landfill facility, with Site #1 operating as a bulky waste disposal area and transfer station. However, instead of using a transfer trailer at the transfer station, a roll-off container with a stationary compactor (Table D-19) is used to handle compactable waste from East Millard. The roll-off container is then transported to Site #4 for disposal, at least weekly.

This system also offers a high level of service, but the efficiency of the roll-off transfer station is less than that of the transfer trailer, resulting in higher operating costs. Total cost for the system (see Table 10) is higher than that of the first option. Figure 12 illustrates this option.

Option 3. This option also utilizes Site #4 as a sanitary landfill while Site #1 operates as a bulky waste disposal site. This system deletes the greenbox and side-load collection operation for compactable waste. Alternatively, ten roll-off containers (essentially, transfer stations) with stationary compactors (Table D-15), are placed near each incorporated area and also at Site #1. County residents haul wastes to one of the ten sites, and a roll-off truck transports the containers weekly, or as necessary to the West Millard landfill for disposal.

Bulky wastes are handled by nine roll-off containers located with the compactable roll-off containers (no container is necessary at the Fillmore site), and serviced by the same truck. Bulky waste is disposed of at the nearest bulky waste disposal site (Site #1 or Site #4).

The advantage of this system is its lower capital costs and much lower operating costs, primarily due to the elimination of the greenbox side-loading collection subsystem. The corresponding disadvantage is the reduced level of

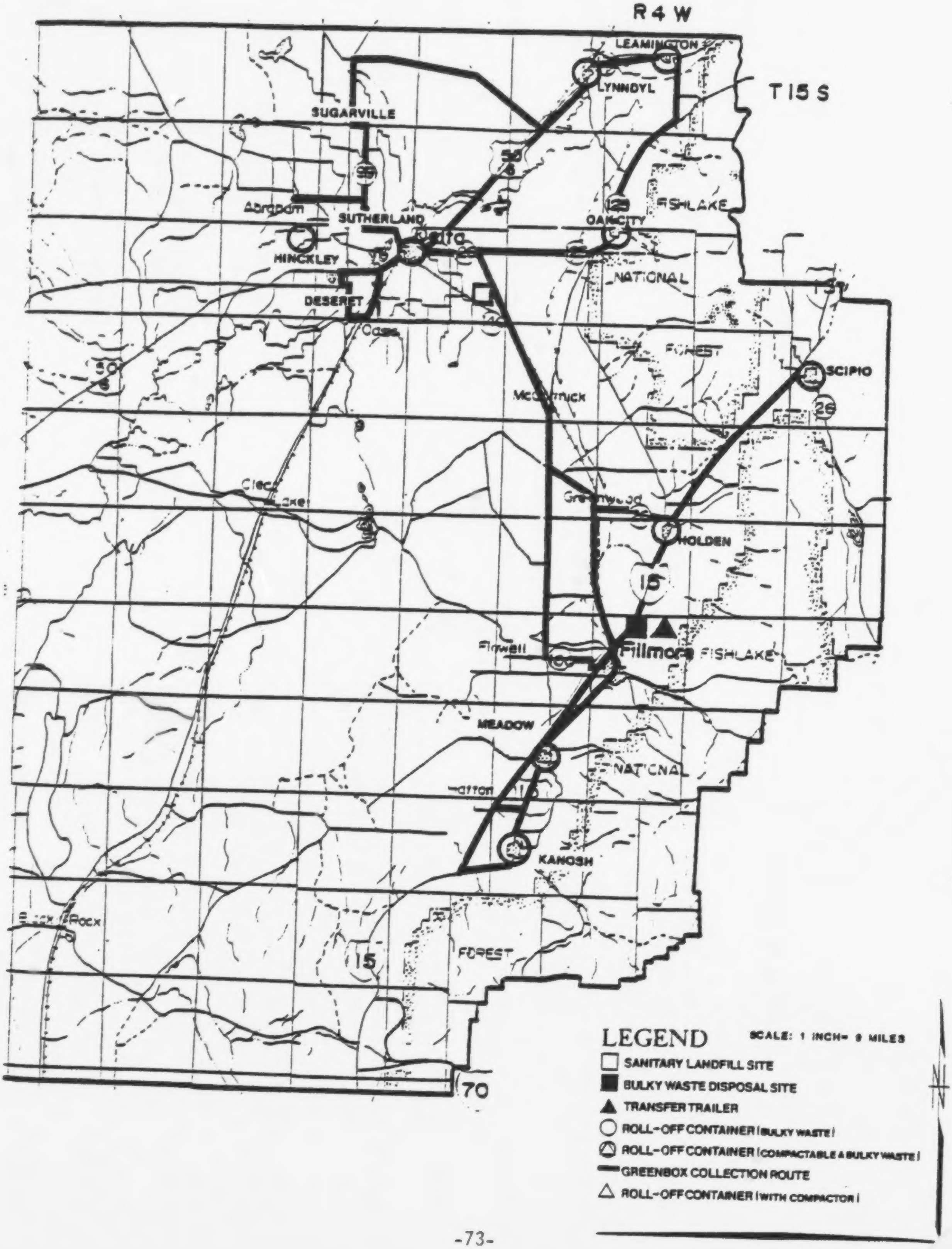
TABLE 10

SOLID WASTE MANAGEMENT ALTERNATIVES
ANNUAL COST SUMMARY

1982

	COLLECTION AND TRANSFER	Cost		DISPOSAL	Cost		Total Cost	
		Base	High		Base	High	Base	High
Option 1	Greenbox Collection	93,400	105,800	Regional Landfill-West Millard	123,500	133,200	$335,700	$365,100
	Transfer Trailer	32,200	33,800	Bulky Waste Disposal Site-East Millard	29,100	29,700		
	Roll-off Transfer (Bulky Waste)	57,500	62,600					
Option 2	Greenbox Collection	93,400	105,800	Regional Landfill-West Millard	123,500	133,200	$347,400	$380,000
	Roll-off Transfer (Compaction)	43,900	48,700	Bulky Waste Disposal Site-East Millard	29,100	29,700		
	Roll-off Transfer (Bulky Waste)	57,500	62,600					
Option 3	Roll-off Transfer (Compaction)	87,000	95,400	Regional Landfill-West Millard	123,500	133,200	$297,100	$320,900
	Roll-off Transfer (Bulky Waste)	57,500	62,600	Bulky Waste Disposal Site-East Millard	29,100	29,700		
Option 4	Greenbox Collection	93,400	105,800	Local Landfill-West Millard	94,200	101,700	$307,200	$340,300
	Roll-off Transfer (Bulky Waste)	57,500	62,600	Local Landfill-East Millard	62,100	70,200		
Option 5	Roll-off Transfer (Compaction)	68,100	75,800	Local Landfill-West Millard	94,200	101,700	$281,900	$310,300
	Roll-off Transfer (Bulky Waste)	57,500	62,600	Local Landfill-East Millard	62,100	70,200		
				1987				
Option 1		138,600	209,800		164,400	210,800	$443,100	$596,100
		35,500	43,300		30,200	33,100		
		74,400	99,100					
Option 2		138,600	209,800		164,400	210,800	$461,500	$637,700
		53,900	84,900		30,200	33,100		
		74,400	99,100					
Option 3		120,500	163,800		164,400	210,800	$389,500	$506,800
		74,400	99,100		30,200	33,100		
Option 4		138,600	209,800		130,400	168,000	$423,800	$578,900
		74,400	99,100		80,400	102,000		
Option 5		98,200	128,500					
					130,400	168,000	$383,400	$497,600
					80,400	102,000		

Figure # 11
SOLID WASTE COLLECTION & DISPOSAL
Millard County, Utah
Option # 1


R 4 W
T 15 S
LEAMINGTON
LYNNDYL
SUGARVILLE
50
6
99
Abraham
SUTHERLAND
HINCKLEY
Delta
6
125
OAK CITY
FISHLAKE
NATIONAL
DESERET
Oasis
FOREST
SCIPIO
26
50
6
McCornick
9
Clear Lake
Greenwood
26
HOLDEN
15
Fillmore
FISHLAKE
Flowell
MEADOW
NATIONAL
Hatton
KANOSH
Black Rock
15
FOREST
70
LEGEND
SCALE: 1 INCH= 8 MILES
☐ SANITARY LANDFILL SITE
■ BULKY WASTE DISPOSAL SITE
▲ TRANSFER TRAILER
○ ROLL-OFF CONTAINER (BULKY WASTE)
ROLL-OFF CONTAINER (COMPACTABLE & BULKY WASTE)
GREENBOX COLLECTION ROUTE
△ ROLL-OFF CONTAINER (WITH COMPACTOR)
N

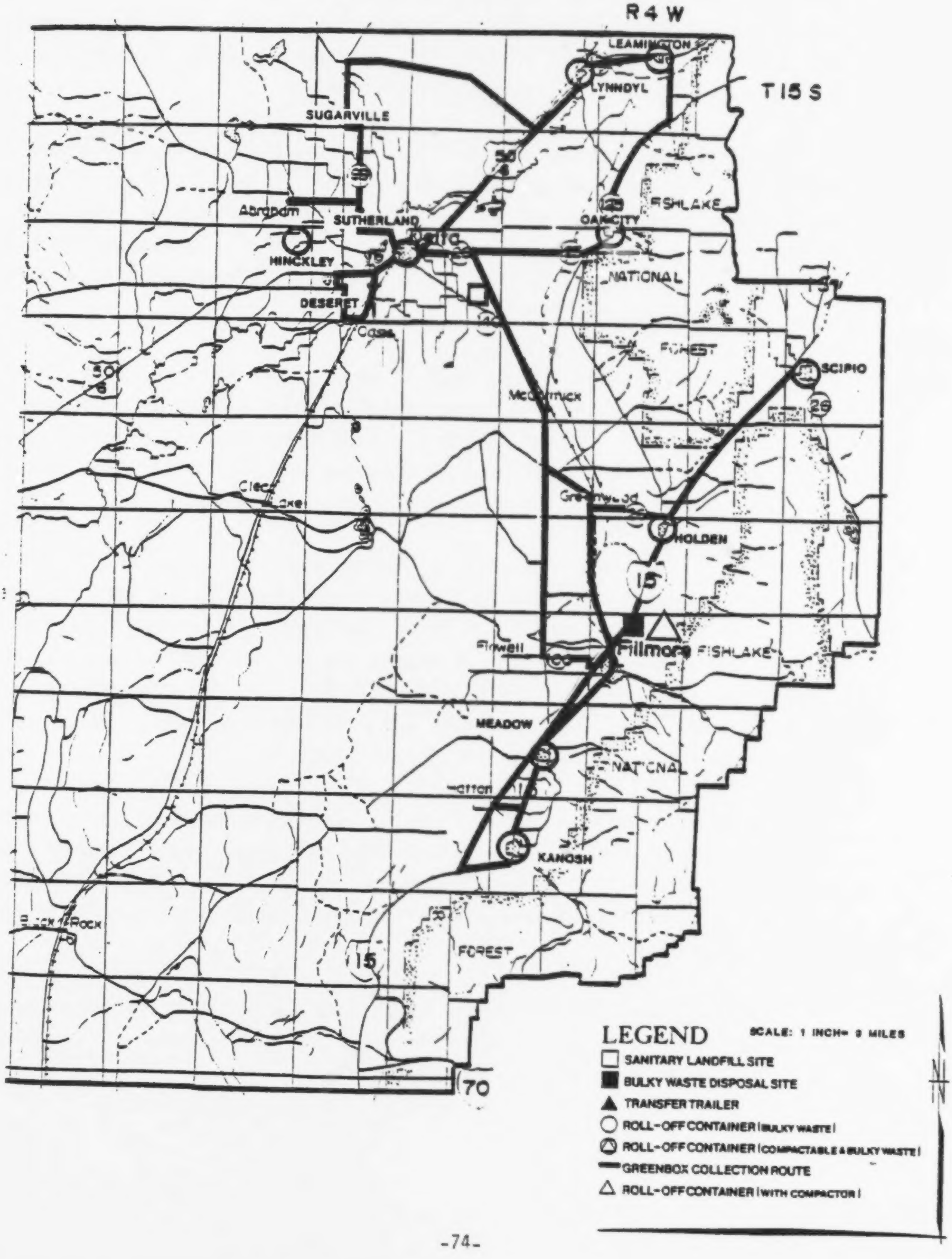


Figure * 12
SOLID WASTE COLLECTION & DISPOSAL
Millard County, Utah
Option *2

R 4 W
T 15 S
LEAMINGTON
LYNNDYL
SUGARVILLE
Abraham
SUTHERLAND
Delta
HINCKLEY
DESERET
Oasis
OAK CITY
FISHLAKE
NATIONAL
FOREST
SCIPIO
McCornick
Greenwood
HOLDEN
Flowell
Fillmore
FISHLAKE
MEADOW
NATIONAL
Hatton
KANOSH
Clear Lake
Black Rock
FOREST
50
6
125
15
26
70
LEGEND
SCALE: 1 INCH= 8 MILES
☐ SANITARY LANDFILL SITE
■ BULKY WASTE DISPOSAL SITE
▲ TRANSFER TRAILER
○ ROLL-OFF CONTAINER (BULKY WASTE)
◬ ROLL-OFF CONTAINER (COMPACTABLE & BULKY WASTE)
— GREENBOX COLLECTION ROUTE
△ ROLL-OFF CONTAINER (WITH COMPACTOR)
N

service and possible safety problems, as County residents would operate the compaction unit at the roll-off site. Extensive public education would be necessary for safe and efficient operation of this system. Costs are presented in Table 10, and the system is illustrated in Figure 13.

Option 4. The last two options differ from the first three in functions of the landfills in use. Because there are two landfills, near Delta and Fillmore, the transfer subsystem can be eliminated. Costs for operation of Sites #4 and #1 are presented in Tables D-3 and D-5, respectively. A greenbox collection system (with waste hauled to the nearest landfill) is combined with a bulky waste collection system (Table D-13), as in Option 1.

This system provides a high level of service, and operating costs are reduced for waste collection and transportation, due to a shorter haul distance to the nearest landfill. However, relatively high additional capital expenditures are required in future years. The cost assocated with this option are displayed in Table 10 (see Figure 14 for illustration).

Option 5. The final system to be analyzed approximates Option 3, with the following exceptions. Two landfills are in use (Sites #1 and #4,) and nine rather than ten roll-off containers (with compactors) are in use (Table D-17). One roll-off unit can be eliminated because the Fillmore disposal site is convenient for Fillmore residents. Bulky wastes are serviced by nine roll-off containers, located with the compactable waste roll-off containers. Waste (compactable and bulky) is hauled to the nearest landfill.

The advantage of this system is its low capital and operating costs, due to the use of two landfills and the corresponding decrease in waste transportation costs. As in Option 3, a disadvantage of this system is potential public safety problems. Table 10 summarizes the corresponding costs, and Figure 15 illustrates the system.

The next chapter identifies the solid waste management system recommended for Millard County. Detailed information necessary for the successful implementation and operation of the system is provided.

Figure* 13
SOLID WASTE COLLECTION & DISPOSAL
Millard County, Utah
Option *3

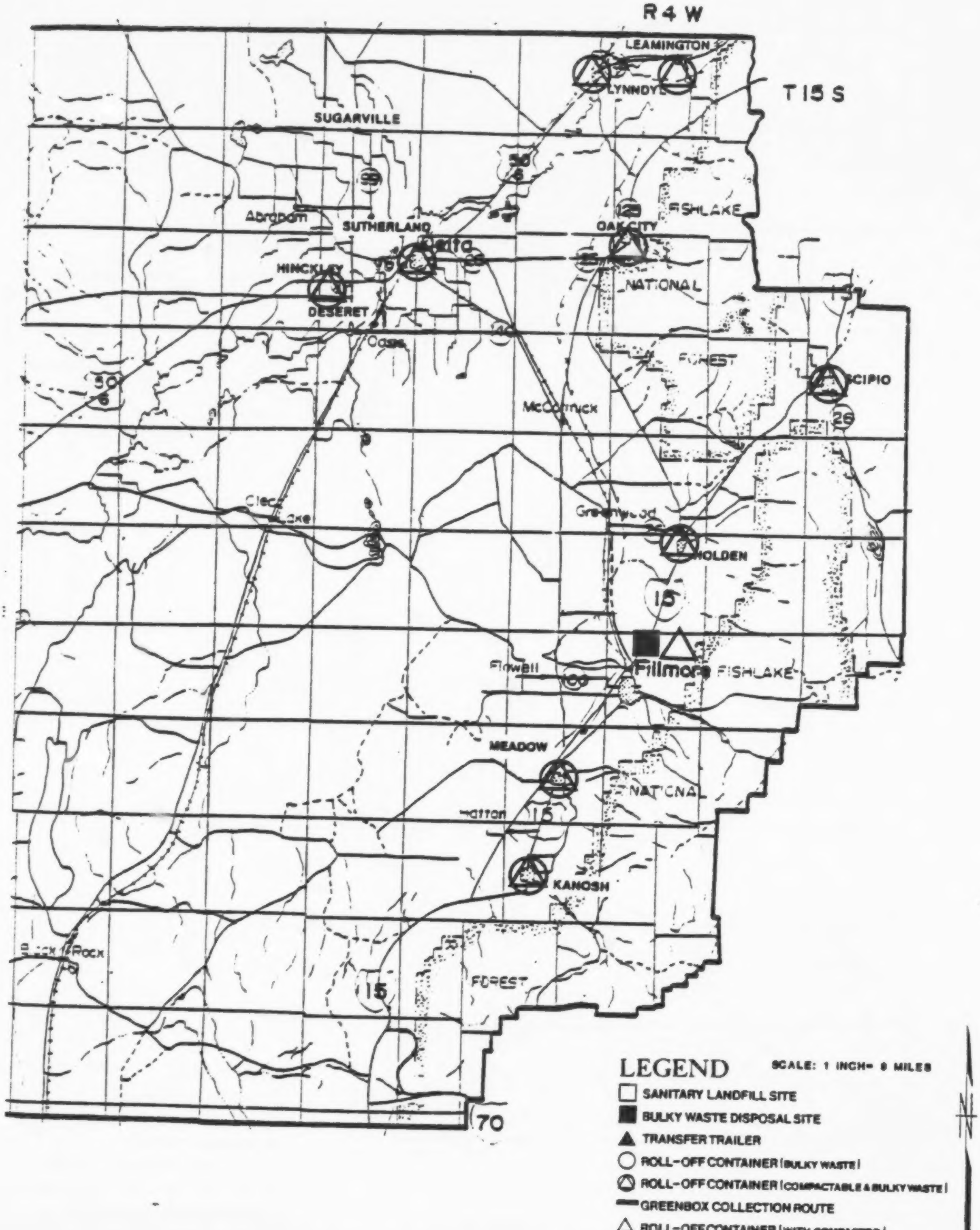

R 4 W
T 15 S
LEAMINGTON
LYNNDYL
SUGARVILLE
FISHLAKE
OAK CITY
SUTHERLAND
Abraham
Delta
HINCKLEY
DESERET
NATIONAL
Oasis
FOREST
SCIPIO
McCornick
Clear Lake
Greenwood
HOLDEN
Flowell
Fillmore
FISHLAKE
MEADOW
NATIONAL
Hatton
KANOSH
Black Rock
FOREST
15
70
LEGEND
SCALE: 1 INCH= 8 MILES
SANITARY LANDFILL SITE
BULKY WASTE DISPOSAL SITE
TRANSFER TRAILER
ROLL-OFF CONTAINER (BULKY WASTE)
ROLL-OFF CONTAINER (COMPACTABLE & BULKY WASTE)
GREENBOX COLLECTION ROUTE
ROLL-OFF CONTAINER (WITH COMPACTOR)
N

Figure ° 14
SOLID WASTE COLLECTION & DISPOSAL
Millard County, Utah
Option ° 4

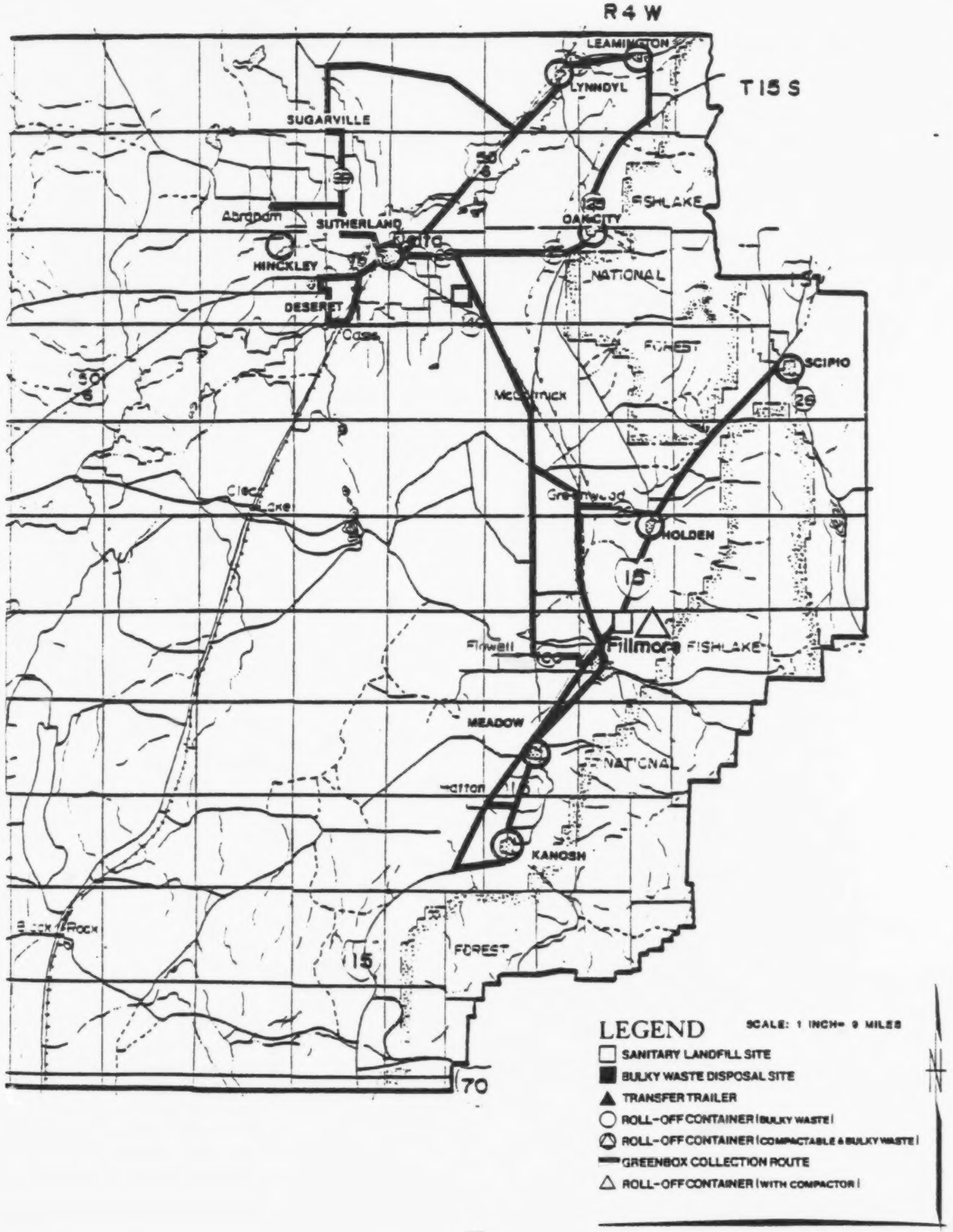
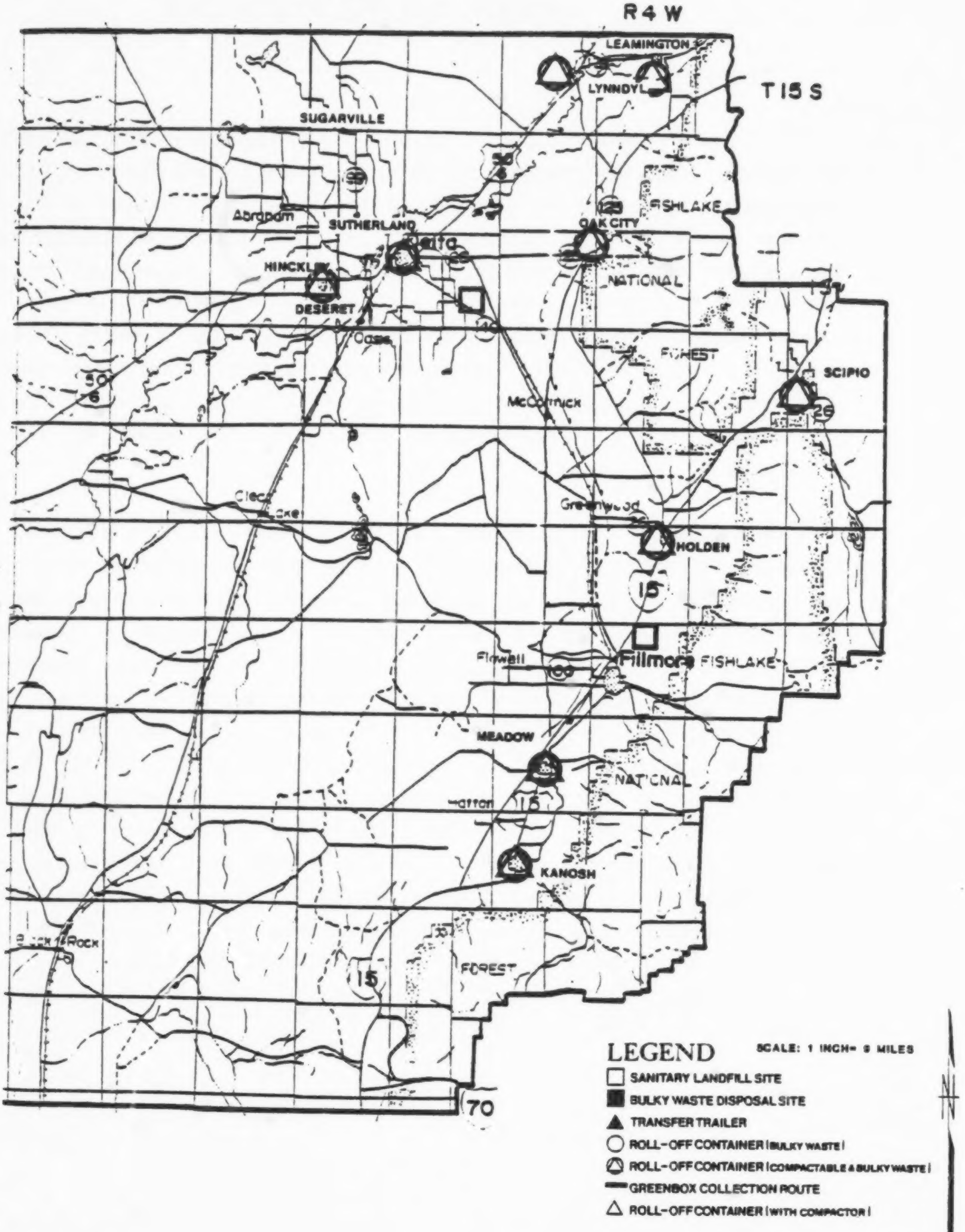

R 4 W
T 15 S
LEAMINGTON
LYNNDYL
SUGARVILLE
50
6
FISHLAKE
125
OAK CITY
Abraham
SUTHERLAND
Delta
HINCKLEY
NATIONAL
DESERET
Oasis
FOREST
SCIPIO
26
McCornick
Greenwood
HOLDEN
15
Flowell
Fillmore
FISHLAKE
MEADOW
NATIONAL
Hatton
KANOSH
Black Rock
15
FOREST
70
N
LEGEND
SCALE: 1 INCH= 9 MILES
SANITARY LANDFILL SITE
BULKY WASTE DISPOSAL SITE
TRANSFER TRAILER
ROLL-OFF CONTAINER (BULKY WASTE)
ROLL-OFF CONTAINER (COMPACTABLE & BULKY WASTE)
GREENBOX COLLECTION ROUTE
ROLL-OFF CONTAINER (WITH COMPACTOR)

Figure* 15
SOLID WASTE COLLECTION & DISPOSAL
Millard County, Utah
Option*5


R 4 W
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LEAMINGTON
LYNNDYL
SUGARVILLE
Abraham
SUTHERLAND
Delta
HINCKLEY
DESERET
OAK CITY
FISHLAKE
NATIONAL
FOREST
Oasis
SCIPIO
McCormick
Clear Lake
Greenwood
HOLDEN
Flowell
Fillmore
FISHLAKE
MEADOW
NATIONAL
Hatton
KANOSH
Black Rock
FOREST
15
26
50
6
100
125
132
70
LEGEND
SCALE: 1 INCH= 9 MILES
☐ SANITARY LANDFILL SITE
■ BULKY WASTE DISPOSAL SITE
▲ TRANSFER TRAILER
○ ROLL-OFF CONTAINER (BULKY WASTE)
ROLL-OFF CONTAINER (COMPACTABLE & BULKY WASTE)
GREENBOX COLLECTION ROUTE
△ ROLL-OFF CONTAINER (WITH COMPACTOR)
N

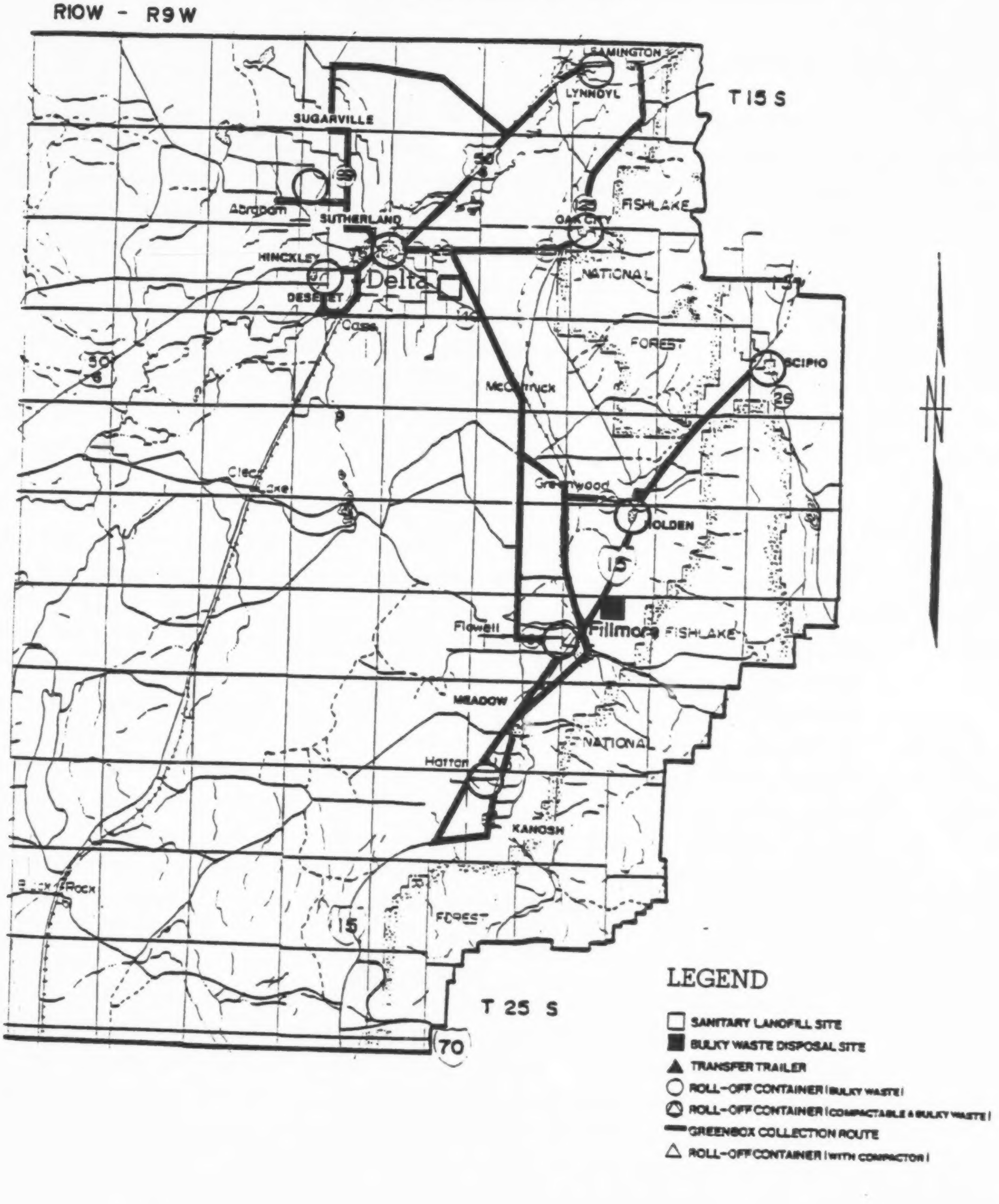
VI. RECOMMENDED SOLID WASTE MANAGEMENT PLAN

A. Introduction

This chapter details specific solid waste management recommendations for the County. Input was received from town, County, State and Federal officials, regarding the collection and disposal options discussed in Chapter V, and was utilized in developing the recommendations. The collection and disposal costs for the 1982 base growth scenario are also presented. Recommendations concerning the closure and cleanup of existing open dump sites are made, and related costs are established. In addition, management and financing plans are presented. An estimate of the waste management system's total annual cost is made, and general trends in waste collection and disposal from 1982 to 2000 are discussed. Finally, an implementation schedule for the recommended plan is introduced.

The recommended collection and disposal system determined to be optimal for the County is a combination of Options 2 and 4. Greenbox collection is employed for compactable waste, and roll-off containers, located near each incorporated area, service bulky wastes. Greenbox containers are recommended for compactable waste collection, rather than roll-off containers with stationary compactors, due to potential safety and maintenance problems related to the compactors. Smaller containers also maximize flexibility, as changes in waste capacity can be managed by adding or removing greenboxes. One regional landfill, located southeast of Delta, is proposed for disposal of the entire County's compactable waste, and West Millard's bulky waste. The recommended plan also includes the use of the existing Fillmore disposal site as a bulky waste facility servicing East Millard County. The development of one, rather than two, full-scale landfill sites entails fewer administrative and operational difficulties for the County. The bulky waste site near Fillmore could be converted to a sanitary landfill in the future, if necessary. Figure 16 illustrates the recommended option.

Figure # 16
SOLID WASTE COLLECTION & DISPOSAL
Millard County, Utah
RECOMMENDED PLAN


RIOW - R9W
T 15 S
LEAMINGTON
LYNNDYL
SUGARVILLE
Abraham
SUTHERLAND
HINCKLEY
Delta
DESERET
Cass
OAK CITY
FISHLAKE
NATIONAL
FOREST
SCIPIO
McCornick
Clear Lake
Greenwood
HOLDEN
Flowell
Fillmore
FISHLAKE
MEADOW
NATIONAL
Hatton
KANOSH
Black Rock
FOREST
T 25 S
15
70
50
6
26
125
N
LEGEND
□ SANITARY LANDFILL SITE
■ BULKY WASTE DISPOSAL SITE
▲ TRANSFER TRAILER
○ ROLL-OFF CONTAINER (BULKY WASTE)
ROLL-OFF CONTAINER (COMPACTABLE & BULKY WASTE)
GREENBOX COLLECTION ROUTE
△ ROLL-OFF CONTAINER (WITH COMPACTOR)

SCALE: 1"- 9 Miles

B. Collection Procedures

Greenbox System

This component of the collection system is comprised of 535 three-cubic yard containers conveniently located throughout the populated areas of the County, serviced by two 30-cubic yard packer trucks. The containers will receive residential and commercial compactable waste. Examples of residential waste handled by these containers are food waste, cans, bottles, paper, clothing, small appliances, yard waste, and bagged or bundled twigs or small limbs. Commercial waste consists primarily of food waste and packaging and shipping materials. Burning materials will not be permitted in greenboxes. Ashes from fireplaces or stoves should be stored outside by residents in metal containers for several days before disposal to decrease the potential for fire in the containers.

Greenboxes used by the residential sector in Delta and Fillmore will be serviced twice weekly, to reduce the number of containers that would be required to provide service once per week. Fewer containers are utilized due to space considerations. Residential containers in the remainder of the County will be serviced once weekly. It was determined (through use of waste generation rates presented in Chapter III) that rural residential users, and customers in all towns exluding Delta and Fillmore, would require one 3-cubic yard container per 21 persons in the service area, with weekly service. Delta and Fillmore residential users require one container per 30 persons, with service twice per week. This is due to the greater daily variation in waste generation in larger towns, with most waste produced on weekends, requiring more container capacity. The estimated number of containers needed for residential use are presented below. Appendix F presents sample calculations for the County's greenbox requirements.

Commercial account requirements will vary from one container serviced weekly, to multiple containers serviced several times per week. For the purpose of cost estimation, an assumption of tri-weekly service of each commercial container was used. West Millard County currently requires 58 commercial containers, while East Millard requires 38, based on the waste generation rates developed in Chapter III.

REQUIRED GREENBOX CONTAINERS

West Millard		East Millard	
Residential		Residential	
Delta	106	Fillmore	77
Hinckley	34	Meadow	15
Lynndyl	8	Kanosh	19
Leamington	7	Holden	24
Oak City	23	Scipio	12
Unincorporated	87	Unincorporated	27
Subtotal	265	Subtotal	174
Commercial	58	Commercial	38
TOTAL	323	TOTAL	212

Container Locations and Routing

The location of greenbox sites will be determined by individual communities, and will be a function of public convenience, available land and the most efficient routing. General criteria for siting exist, including accessibility in all weather conditions. This may require grading for drainage and gravelling. Sites must be large enough to permit waste unloading, container servicing, and vehicle maneuvering without creating traffic hazards. When greenboxes are clustered, a pull-off and turn-around area are necesssary. When roll-off containers are used, greenboxes should be located at the site to prevent dumping of compactable waste in the bulky waste system. Mixing wastes decreases efficiency, as waste is not compacted. Also, roll-off containers are not serviced frequently enough to receive wastes which decompose. If sites are located on a state highway right-of-way, approval from the State Highway Department is needed. Private property owners may allow free use of their land, for the convenience of nearby containers. City, County or state land may also be available for use.

The decision to cluster or distribute individual greenboxes should be made by each community. Advantages inherent in clustering residential greenboxes include a decrease in container servicing time and the amount of locations required for greenbox siting, resulting in less expense but reduced convenience for customers. If the decision to cluster greenboxes is made, it is recommended that Lynndyl, Leamington, Oak City, Meadow, Kanosh, Holden, and Scipio locate all their greenboxes at their individual roll-off container site. Delta, Hinckley, and Fillmore should locate some greenboxes at their individual community roll-off sites, in addition to establishing other greenbox sites, due to the large number of required greenboxes. Unincorporated areas should cluster greenboxes in groups of five or more, in convenient locations. An example of a potential greenbox site for the Delta area is near the junction of the railroad tracks and Highway 6/50 in west Delta. A possible location for the Deseret-Oasis area is the junction of Highway 140 and the railroad tracks. Commercial containers will be located adjacent to the facility serviced. It is suggested that the sites allow room for expansion. One hundred square feet would allow ample area for one greenbox.

In determining greenbox collection routes and associated costs, the following assumptions were used:

- Residential containers in Fillmore and Delta are serviced twice weekly. All other residential containers are serviced once weekly;

- Service time per container averages 1.5 minutes;

- Travel speed for East and West Millard routes is 30 miles per hour, excluding Route W-2 (45 mph). Travel speed between the east area and the regional landfill would be higher;

- The average number of containers per vehicle load is 40 (assumes a 4:1 compaction ratio).

Table 11 describes the East (E) and West (W) Millard routes, and the type of waste collected and area covered on each route. A daily breakdown of routes and the required miles and hours is provided. The two compaction trucks are numbered Units I and II.

TABLE 11

WEEKLY COLLECTION ROUTES

Route	Service Area	Waste Type
W-1	Delta	Residential and Commercial
W-2	Oak City-Leamington-Lynndyl	Residential
W-3	Hinckley-Unincorporated South Delta Area	Residential
W-4	Unincorporated North Delta Area	Residential
W-5	Delta	Commercial
E-1	Fillmore	Residential and Commercial
E-2	Fillmore	Commercial
E-3	Fillmore	Residential
E-4	Kanosh-Meadow-Unincorporated	Residential
E-5	Scipio-Holden-Unincorporated	Residential

Day	Unit	Route	Containers	Miles	Hours
Monday	I	W-1	164	60	6.1
	II	E-1	80	190	5.0
Tuesday	I	W-2	38	50	2.1
	I	W-3	40	22	1.8
	II	E-3	80	190	5.0
Wednesday	I	W-5	58	30	2.5
	I	E-5	40	90	3.2
	II	E-2	38	100	3.8
Thursday	I	W-4	40	30	2.0
	I II	E-4 E-4	72	220	6.7
Friday	I	W-1	164	60	6.1
	II	E-1	80	190	5.0
TOTAL			894	1,232	49.3

Staffing Requirements

A full-time collection vehicle driver will be responsible for greenbox collection routes, and will be assisted on a half-time basis by a member of the open dump closure crew. The full-time employee will be responsible for preventive maintenance of the collection vehicles, and maintaining daily mileage and waste volume records.

Equipment Requirements

Two side-loading compaction vehicles will be needed to service the 535 3-cubic yard greenboxes. Specifications for the chassis include:

- A standard cab with a minimum 200 HP diesel engine and a six-speed transmission;
- A minimum 30,000 pound Gross Vehicle Weight (GVW) Tandem 4.5-1 ratio rear axle;
- A minimum 10,000 pound GVW front axle;
- Air brakes and a parking brake;
- An extra heavy duty cooling and lighting system (D.O.T. lighting);
- 10 x 20 inch 12-ply rating steel belted tires (11) and disc-type wheels (11);
- A diesel fuel system with a minimum 75 gallon on-board capacity; and
- A full heating system with a 110 volt A.C. overnight heater.

The side-loading compaction body should be a heavy duty, 30-cubic yard capacity system, with a minimum 2,000 pound lifting capacity. It should be equipped with: a rear door which opens hydraulically and locks; a front-mounted, crankshaft-powered, air-actuated power take-off; and approved clearance lights, a rotary beacon, rear lights for unloading, and side lights.

Figure 17 outlines the equipment and labor requirements for collection as well as disposal and open dump closure.

Roll-off System

This component of the collection system involves the use of ten 40-cubic yard roll-off containers, located near each incorporated area. The containers will be serviced as required by a tilt frame vehicle. Residential and commercial non-compactable waste will be disposed of in the roll-offs, including such wastes as lumber, masonry, large appliances (stoves, refrigerators), furniture, auto tires, tree limbs or trunks (shorter than five feet in length), and fencing material. Large quantities of such wastes should be disposed of at the nearest landfill or bulky waste disposal site, to conserve space in the roll-off containers. If a commercial or industrial establishment generates large quantities of bulky waste consistently, the facility may arrange to buy a roll-off container through the County system.

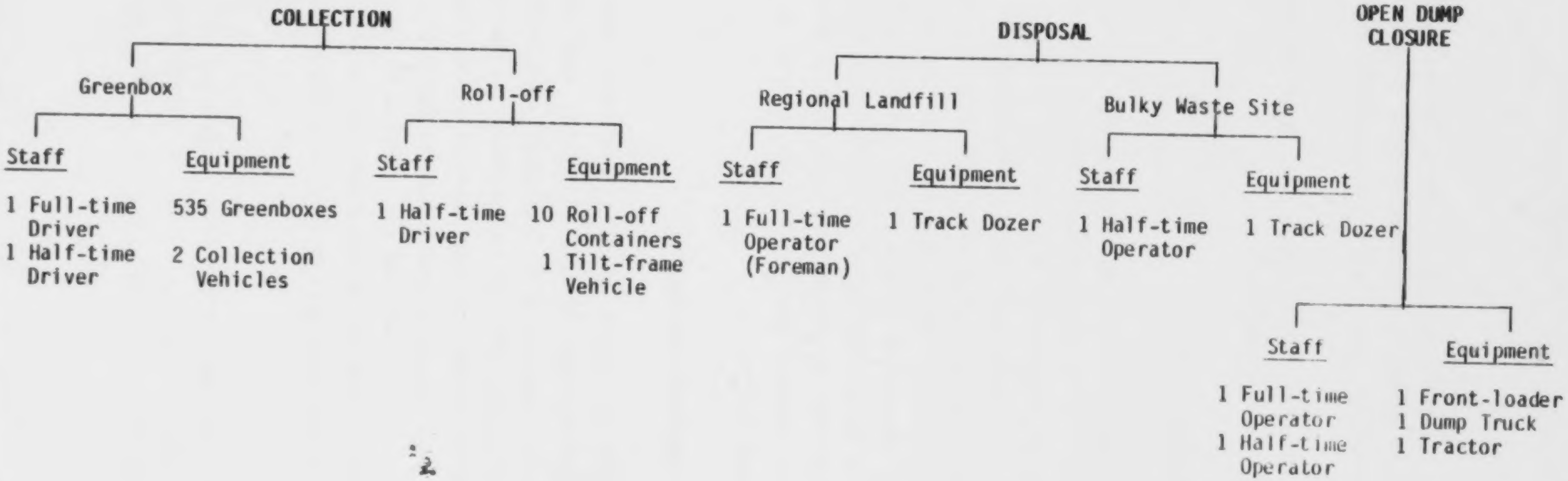
Container Locations and Routing

The decision to locate roll-off containers near each incorporated area reflects the cost savings inherent in shorter haul distances, and the association of community identity with individual container sites. As in greenbox siting, each community will be responsible for the final location of a site. Some major considerations are road conditions and land use. Adequate area is necessary for waste unloading and container servicing. Approximately one quarter of an acre would be required for a roll-off site. More area is required than for a greenbox station, as containers are larger, more maneuvering space is necessary, and a retaining wall or ramp is necessary to provide public access to the container.

Suggested locations for roll-off containers are at major road intersections, along heavily traveled roads, or immediately adjacent to population centers. In the Millard County system, nine sites would be utilized (the tenth

FIGURE 17

ELEMENTS OF THE RECOMMENDED SOLID WASTE
MANAGEMENT PLAN
MILLARD COUNTY, UTAH


COLLECTION
Greenbox
Staff
1 Full-time Driver
1 Half-time Driver
Equipment
535 Greenboxes
2 Collection Vehicles
Roll-off
Staff
1 Half-time Driver
Equipment
10 Roll-off Containers
1 Tilt-frame Vehicle
DISPOSAL
Regional Landfill
Staff
1 Full-time Operator (Foreman)
Equipment
1 Track Dozer
Bulky Waste Site
Staff
1 Half-time Operator
Equipment
1 Track Dozer
OPEN DUMP CLOSURE
Staff
1 Full-time Operator
1 Half-time Operator
Equipment
1 Front-loader
1 Dump Truck
1 Tractor

container travels with the truck). Individual sites will be required at Oak City, Scipio, Holden, and Fillmore. A single container will service Leamington and Lynndyl, and should be located midway between the towns. Meadow and Kanosh will also share a container, and a possible location is the Hatton exit off of Highway 91. The Delta incorporated area will utilize one container. A potential site is the junction of Highway 6/50 and the two rail lines. The Hinckley-Deseret-Oasis users could locate another roll-off site at the junction of Highway 6/50 and Highway 257. The Sutherland-Sugarville-Abraham area will require another site.

In determining roll-off collection requirements, the following assumptions were made:

- Containers will be serviced as necessary, depending on the waste quantity received. Containers are assumed to be 80 percent full (32 cy) when serviced;
- Service time per container, for loading and unloading with the tilt frame truck, is a total of 30 minutes;
- Travel speed varies from 30 to 50 mph (see Table 12);
- One third of the total demolition/construction waste produced in the County (.5 pounds out of 1.5 total pounds) will be placed in the roll-off containers.

The assumption of one third of the total demolition/construction waste being serviced in the roll-off system is a result of the expectation of production of large quantities of such waste by building contractors. If dumping of truck load quantities of such waste into roll-off containers is not allowed (as recommended), the bulk of this waste will be transported to rubble dumps by the contractor.

Table 12 presents the annual number of trips required to service each area in the County. The total mileage and hours required were used to develop costs presented in Table 13. An example of the procedure used to determine servicing time for the Oak City container follows:

TABLE 12

ANNUAL ROLL-OFF COLLECTION SUMMARY

Service Area	Trips	Miles per Trip	Miles per Hour	Miles	Hours
West Millard					
Delta-Hinckley-Sutherland	87	30	30	2,610	130.5
Oak City	8	30	50	240	8.8
Lynndyl-Leamington	5	40	50	200	6.5
WEST TOTAL	100			3,050	145.8
East Millard					
Fillmore--50% Unincorporated	40	10	30	400	33.3
Holden	8	25	50	200	8.0
Scipio	4	50	50	200	6.0
Meadow-Kanosh-50% Unincorporated	15	25	30	375	20.0
EAST TOTAL	67			1,175	67.3
WEST to EAST[1]	40	70	50	2,800	56.0
TOTAL	167			7,025	269.1

---

[1] Roundtrips required from the regional landfill to the East Millard bulky waste site.

TABLE 13

COLLECTION COST SUMMARY
GREENBOX SYSTEM
1982 CAPITAL COSTS

Item	Unit Cost	Units	Total Cost
Equipment			
Compactor Trucks (30 cy, side-loading)	$70,000/unit	2	$140,000
Containers (3 cy)	$300/unit	535	$160,500
		TOTAL	$300,500
		AMORTIZED	$ 48,900

1982 OPERATING COSTS

Item	Unit Cost	Units	Total Cost
Equipment Operation			
Compactor Trucks	$13.80/hr.	3,070	$ 42,400
Labor			
Drivers/	$10/hr.	3,070	$ 30,700
Mechanics	$10/hr.	420	$ 4,200
		TOTAL	$ 77,300
		TOTAL ANNUAL COST	$126,200

ROLL-OFF SYSTEM
1982 CAPITAL COSTS

Item	Unit Cost	Units	Total Cost
Equipment			
Roll-off Truck	$50,000/unit	1	$ 50,000
Roll-off Containers (40-cy, open-top)	$5,500/unit	10	$ 55,000
		TOTAL	$105,000
		AMORTIZED	$ 17,100

1982 OPERATING COSTS

Item	Unit Cost	Units	Total Cost
Equipment Operation			
Roll-off Truck	$13.80/hr.	325	$ 4,500
Labor			
Driver/	$10/hr.	325	$ 3,300
Mechanic	$10/hr.	210	$ 2,100
		TOTAL	$ 9,900
		TOTAL ANNUAL COST	$ 27,000
		TOTAL COLLECTION COST	$153,200

(470 people)x(1 lb/person/day)[1]x(365 days/year)÷(750 lb/yd^3)=229 yd^3/year
(229 yd^3/year)÷(32 yd^3/trip)=7.15 trips/year
(8 trips/year)x(30 miles/trip)=240 miles
(240 miles)÷(50 miles/hour)=4.8 hours
4.8 hours+[(8 trips)x(30 minutes per trip for loading and unloading)]
=8.8 hours/year

The total number of hours could then be applied to the hourly equipment operation and labor costs to determine roll-off collection expenses.

Staffing Requirements

This segment of the solid waste plan requires a full-time roll-off collection vehicle driver. The employee is responsible for all bulky waste collection routes, operation of the bulky waste site at Fillmore, preventive maintenance of collection vehicle and bulky waste disposal site equipment, and maintenance of daily vehicle mileage and waste volume records. The packer truck and roll-off vehicle drivers should be experienced heavy equipment operators with good driving records, basic mechanical skills, and the ability to maintain good customer relations.

Equipment Requirements

A tilt-frame roll-off collection vehicle and ten 40-cubic yard containers are needed to operate the system. The collection vehicle chassis specifications are the same as the side-loading vehicle specifications. Additional requirements are: a 40,000 pound minimum line-pull drum hoist; a transmission-mounted power take-off, and lighting as required by the Department of Transportation.

Collection Costs

Collection costs, based on 1982 waste generation rates and prices, are presented in Table 13, for a full year of operation. These costs are effective after the implementation period has occurred (approximately six months in duration), during which landfills and container sites are prepared. Table 13 does not include all collection-related costs, as costs incurred by site development have been itemized in Table 16, Implementation Costs.

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[1] Includes .5 lb/person/day each of residential and demolition/construction waste (see Table 3).

Capital costs have been amortized at 10 per cent interest over 10 years (a Capital Recovery Factor of .16275). Labor and equipment operating hours include an 80 per cent efficiency factor. This factor was not used in developing the costs in Tables D-1 through D-20 and Table 10. However, these tables are consistent as a group for comparison of option costs. Hourly labor rates include a 35% fringe benefits package, which is provided by the County. Four hours per week per machine has been allowed for preventive maintenance.

C. Disposal Procedures

Regional Landfill

The Southeast Delta site is recommended for use as a regional, trench-type landfill, which will receive the entire County's compactable waste stream via packer trucks. This site will not initially receive bulky wastes, as these wastes will be disposed of at the proposed Fillmore bulky waste site, or the present Delta disposal site. Bulky wastes produced in West Millard will be used to close the Delta site as described in the Open Dump Closure section of this report. This procedure will be utilized until the present Delta site is properly closed. Subsequent to that, bulky wastes produced in West Millard will be disposed of at the Southeast Delta site.

The landfill will be a limited access operation, allowing truckload quantities of residential, commercial, or industrial bulky wastes to be disposed. Contractors producing demolition/construction waste in large quantities should have access to the bulky waste disposal areas. The public will not have open access to the facility. Proposed hours of operation are from 9:00 a.m. to 4:30 p.m., five days per week.

When the landfill reaches the detailed design stage, an engineer should be hired to develop a specific site plan. At this point, additional soil and groundwater information will be available because testing will have been performed. In developing the preliminary cost estimates presented in this report, these design parameters were followed. Trenches are 15 feet deep, with a 22 foot base, 52 foot upper width, and 1:1 sidewalls. The area between trenches is 10 feet wide. Using the current County compacted waste production estimate of 24,300 yd^3/year (excluding bulky wastes produced in East Millard), and a cover to waste ratio of 1:4 by volume, approximately 1,200 feet of trench will be required for 1982 for disposal at the Southeast Delta site (see Appendix F for calculations). This corresponds to approximately two acres per year. Trenches should be excavated perpendicular to the prevailing wind direction, which is westerly in Millard County. This site will require stock fencing, where not presently in place, and litter fencing downwind from the compactable waste trenches. A diversion ditch running east/west along the northeast boundary of the site will also be necessary. A separate, fenced dead animal pit will be available on the southeast corner of the site, with full-time access to the public. A plan view of the site is presented in Figure 18.

Staffing Requirements

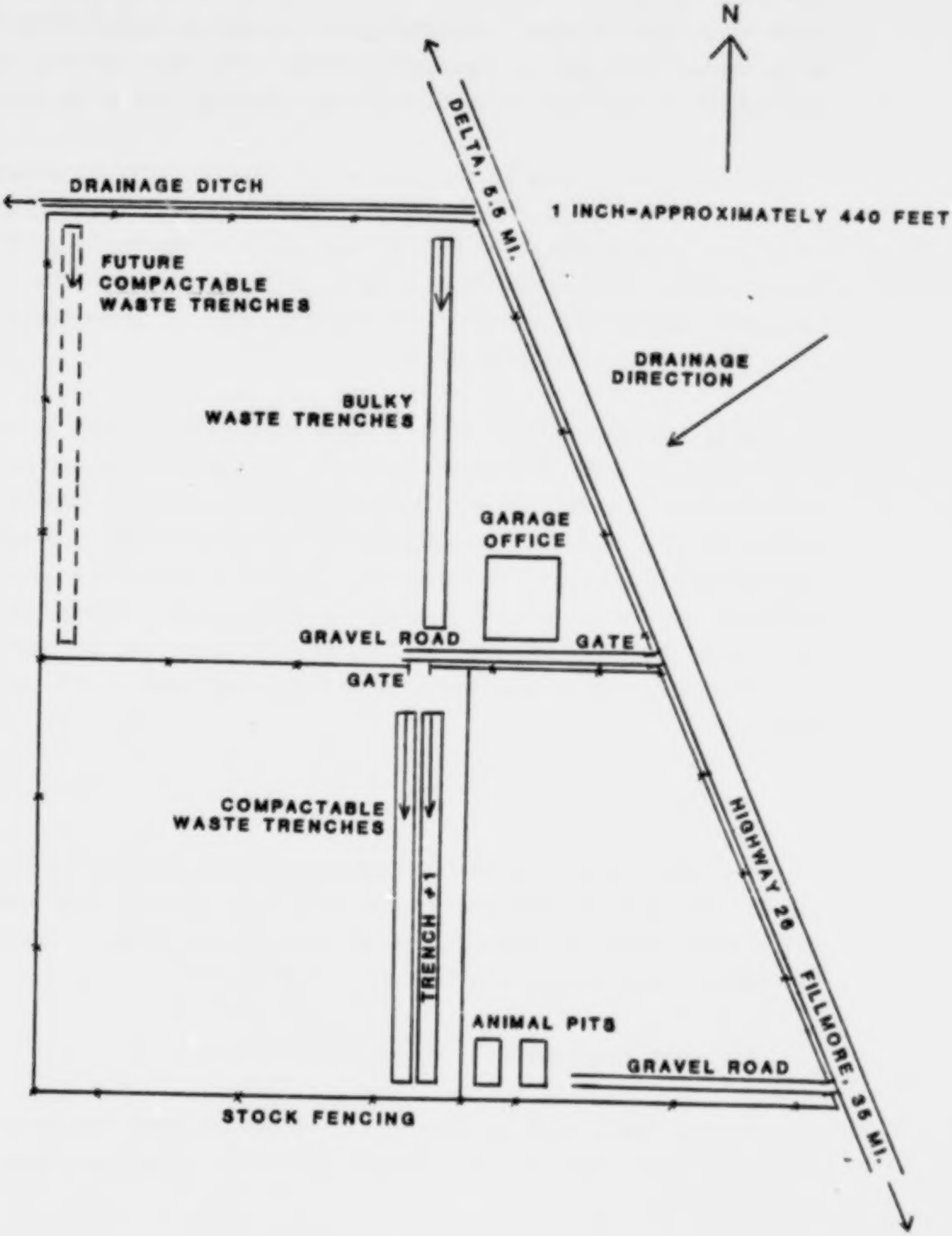
The primary staff member employed at the site is the foreman, who supervises the collection vehicle drivers and Open Dump Closure personnel. This employee is responsible for landfill operation, scheduling of staffing and equipment maintenance, accounting of waste volume and vehicle mileage, and advancement of good public relations through coordination of customer service requirements. The foreman operates the track dozer and loader, and is assisted by the Open Dump Closure staff or collection vehicle drivers when necessary.

Equipment Requirements

A track dozer with a 140 HP engine is recommended. It should be equipped with a roll over prevention (R.O.P.) enclosed cab, hot water heat, and a heavy-duty undercarriage. Accessories needed include a ripper bar, a landfill blade, front and rear lights, and a radio with a public address system (in order to communicate with truck drivers). The dozer can be used for trench excavation, and will be used for compacting and covering waste at the end of each operating day.

FIGURE 18

REGIONAL LANDFILL (SOUTHEAST DELTA)
SITE PLAN
MILLARD COUNTY, UTAH


N
DELTA, 6.5 MI.
DRAINAGE DITCH
1 INCH=APPROXIMATELY 440 FEET
FUTURE
COMPACTABLE
WASTE TRENCHES
DRAINAGE
DIRECTION
BULKY
WASTE TRENCHES
GARAGE
OFFICE
GRAVEL ROAD
GATE
GATE
COMPACTABLE
WASTE TRENCHES
TRENCH #1
HIGHWAY 26
ANIMAL PITS
GRAVEL ROAD
FILLMORE, 35 MI.
STOCK FENCING

Bulky Waste Disposal Site

The present Fillmore disposal area should be used as a disposal site for bulky wastes produced in East Millard County. The area can potentially be operated as a full-service landfill, and serves as a back-up system for the regional landfill in case of poor road conditions, collection equipment failure, future waste volume increases, or population shifts. The site requires some clean up work, which is described in the Closure and Clean Up section of this chapter.

This site will receive the contents of the roll-off containers located in East Millard, and truck-load quantities of bulky wastes transported by private interests. A dead animal pit will be maintained at the facility, with full-time public access. This site will also be a limited access operation, which is not generally open to the public. The proposed hours of operation are from 9:00 a.m. to 4:30 p.m., five days per week.

Using the current East Millard waste generation figures for bulky wastes, about 5,300 yd^3 will be produced in 1982. With a cover to waste ratio of 1:4, approximately .5 acres will be required for 1982. This corresponds to approximately 300 feet of trench (see Appendix F for calculations). Diversion ditches and partial fencing will be necessary. Figure 19 presents a site plan. This site will also be operated as a trench landfill, with trenches running north to south from the present lift. The excess fill generated by trench excavation will be used as cover when the ramp method is employed on top of the trenched area.

Staffing Requirements

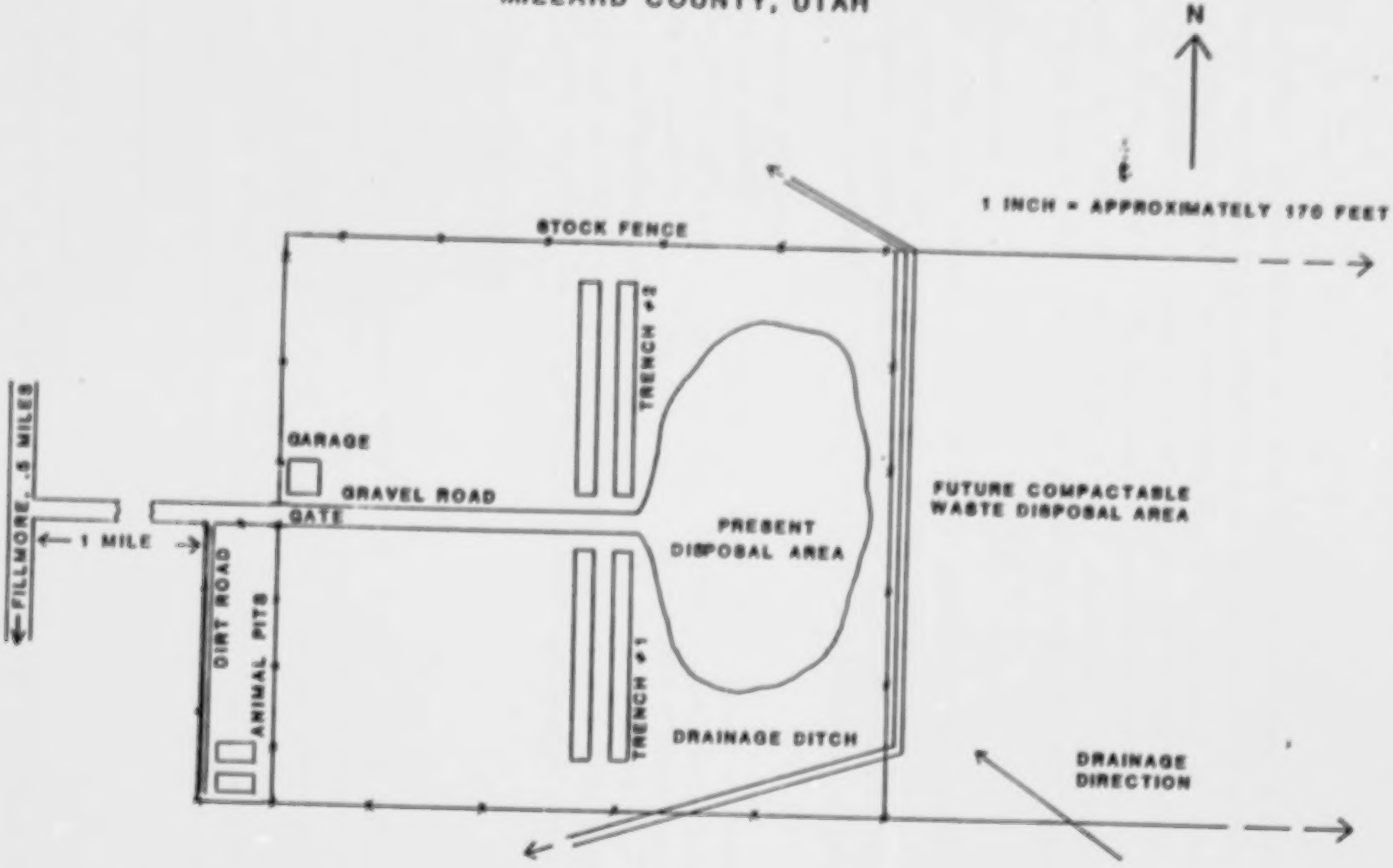
The bulky waste site will be operated by the roll-off collection vehicle driver, who will be assisted by the Open Dump Closure crew when necessary. Daily waste cover is not required at bulky waste sites. Weekly cover was assumed for cost estimation purposes.

Equipment Requirements

A track dozer, with the same specifications as noted for the regional landfill site dozer, will be used at this site. The loader described in the Open

FIGURE 19

BULKY WASTE DISPOSAL (FILLMORE)
SITE PLAN
MILLARD COUNTY, UTAH


N
1 INCH = APPROXIMATELY 170 FEET
STOCK FENCE
TRENCH #2
GARAGE
GRAVEL ROAD
GATE
FILLMORE, .5 MILES
1 MILE
DIRT ROAD
ANIMAL PITS
PRESENT DISPOSAL AREA
TRENCH #1
DRAINAGE DITCH
FUTURE COMPACTABLE WASTE DISPOSAL AREA
DRAINAGE DIRECTION

Dump Closure section can be driven between all disposal sites and used to excavate trenches or diversion ditches.

Disposal Costs

Table 14 presents costs associated with the regional landfill and bulky waste site. These costs reflect a full year of operation, beginning after the system has been implemented. Again, site development costs have been itemized in Table 15, Implementation Costs, so Table 14 does not represent total disposal-related costs. Assumptions regarding amortization, efficiency, fringe benefits, and machinery maintenance are identical to those made in determining collection costs.

Special Waste Disposal

Several wastes require specific disposal methods. For example, baling wire and fencing materials are hard-to-handle wastes which can damage landfill equipment. These materials should be condensed (by rolling, etc.) by the user, disposed of in the roll-off system (if condensed to one cubic yard or less), and deposited at the bottom of the bulky waste trenches. Then, construction and demolition material can be placed over the waste, and it can be compacted and covered with the dozer.

Concrete headgates, in small quantities, can be disposed of in roll-off containers. Otherwise, truckloads can be hauled to the nearest disposal site, and placed on the toe of the working face of the landfill. Concrete or asphalt waste is excellent rip-rap and could be used to stabilize slopes at landfill or open dump sites.

Dead animals can be transported to the nearest rendering plant, placed in a landfill with other wastes, disposed of in a separate pit at a landfill, or buried by an individual on private property. The nearest rendering plant for Millard County use is located in Provo, and the transportation expense makes this option impractical. The recommended method for the County is disposal in separate pits located at the regional landfill and the bulky waste disposal site in Fillmore. The animals would be covered daily with six inches of cover, and

TABLE 14

DISPOSAL COST SUMMARY
REGIONAL (SOUTHEAST DELTA) SITE
1982 CAPITAL COSTS

Item	Unit Cost	Units	Total Cost
Equipment			
Track Dozer (D-6)	$101,000/ unit	1	$101,000
		TOTAL	$101,000
		AMORTIZED	$ 16,400

1982 OPERATING COSTS

Item	Unit Cost	Units	Total Cost
Equipment Operation[1]			
Dozer	$15/hour	1,370	$ 20,600
Loader	$15.30/hour	160	$ 2,500
Labor			
Operator	$12/hour	1,530	$ 18,400
Mechanic	$12/hour	210	$ 2,500
Revegetation	$2,640/acre	1.7	$ 4,500
		TOTAL	$ 48,500
		TOTAL ANNUAL COST	$ 64,900

TABLE 14 (cont.)

DISPOSAL COST SUMMARY
BULKY WASTE SITE (FILLMORE)
1982 CAPITAL COSTS

Item	Unit Cost	Units	Total Cost
Equipment			
Track Dozer (D-6)	$101,000/unit	1	$101,000
		TOTAL	$101,000
		AMORTIZED	$ 16,400

1982 OPERATING COSTS

Item	Unit Cost	Units	Total Cost
Equipment Operation[1]			
Dozer	$15/hour	310	$ 4,700
Labor			
Operator	$10/hour	310	$ 3,100
Mechanic	$10/hour	210	$ 2,100
Revegetation	$2,640/acre	0.5	$ 1,500
		TOTAL	$ 11,400
		TOTAL ANNUAL COST	$ 27,800
		TOTAL DISPOSAL COST	$ 92,700

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[1] Includes trenching, compacting, and covering.

two feet of final cover. Disposal by individuals on private property is acceptable if the owner can ensure that ground or surface water contamination is not likely to occur.

Spray services based at the Delta Airport are the primary source of pesticide containers, another special waste. Certain pesticide and container residues should be treated as a hazardous waste. The recommended method of disposal is to return the material and/or empty containers to the manufacturer, distributor, or another party capable of using it. Otherwise, Federal regulations (which are generally printed directly on approved pesticide containers) must be followed for disposal. Empty containers (tanks, barrels, etc.) can be buried on farm premises, if no threat to ground or surface water exists. The preferred disposal method is triple rinsing, as described in Federal EPA regulations (explained in EPA publication SW-519). The collected rinsate should be utilized to dilute new batches of pesticide. Containers can be crushed at the landfill and disposed of with other compactable waste or recycled at a scrap metal yard.

Currently, one septic sludge pumper operates in the study area. This waste is primarily disposed of at existing sewage treatment facilities in Delta or Fillmore, or less frequently, spread on the pumper's land. Currently, the sewage treatment facilities can handle the quantity of septic pumpings produced. However, as the County grows, this method may not remain practical. If so, landspreading may be used. If landfilling is utilized, a separate area can be designated as a septage pit.

Scrap automobiles are another special waste. Landfills often do not accept automobiles, due to the large amount of space required for storage, and problems encountered with burial. The ideal procedure would be would be scrap metal reclamation. However, transportation costs to distant markets make this option impractical, unless large quantities of vehicles are accumulated. Then, an auto crushing unit from Salt Lake City could be contracted, and the compacted vehicles transported via Salt Lake City to scrap metal markets. Scrap vehicles can be stored at the Delta or Fillmore bulky waste disposal sites, prior to crushing. Storage of vehicles at these sites will allow cost efficient crushing and subsequent transportation.

Hospital wastes are the final type of special waste to be discussed. The hospital in Delta produces pathological and bacteriological wastes. Pathological wastes, such as tissues, should be incinerated at the hospital or transported to another hospital equipped with an incinerator. Ash may be landfilled. Bacteriological waste should be autoclaved or disinfected by other means, prior to disposal at the regional landfill.

The solid waste ordinance suggested in a following section should include explicit provisions for handling special wastes.

D. Open Dump Closure Procedures

The purpose of the clean up and closure of the existing open dump sites is to consolidate, compact, and cover the waste, in order to protect public health and surface and ground water resources and restore the land. A closure method was developed for each site type, and the associated costs are estimated. Site types have been discussed in Chapter III. It must be emphasized that present open dumps should not be closed to public use until the waste collection system is operable, in order to prevent the creation of more open dumps or roadside disposal.

Staffing Requirements

The open dump closure crew will consist of two full-time employees, responsible for closure and maintenance of dump sites. The basic skills required are truck and heavy equipment operating experience, and knowledge of preventive maintenance for equipment. These employees will work approximately four days per week on site clean up and closure, for approximately two and one-half years. They will also serve as a back-up crew for the roll-off driver, sideload driver and landfill operator (foreman). They should be trained to operate all landfill equipment and drive the collection routes. As open dump closure ends, these employees will shift their activities to waste collection and disposal in order to service the growing population. The crew will also provide flexibility during periods of high volume, inclement weather conditions, vacations etc.

Equipment Requirements

The required equipment includes:

- A front loader (rubber-tired, with a 3-cubic yard bucket);
- A used farm tractor (equipped with a front loader with hay forks); and
- A large tandem dump truck.

Closure Methods

Type I Sites

This procedure is applicable to the Sutherland, Deseret, Deseret-Oasis, Hinckley, and Holden dump sites. Closure involves the construction of two parallel berms, two to three feet high, and 50 to 60 feet apart, on the highest ground available on the site. This may require removal of waste from the berm construction area. Berms must be long enough to contain all waste at the site. Waste will be disposed of on the ground surface due to the high seasonal ground water table at these sites. The next step involves separating the bulky wastes; auto bodies, farm equipment, and white goods should be placed together near the bermed area. Wire should be deposited between the berms, and covered first with compactable waste, and then demolition and construction waste, which can be compacted with a crawler dozer. Concrete and asphalt waste can be used to cover the compacted material, or to fill onsite trenches, if present. The deposited waste should be covered with two feet of final cover. The final grade of the site should be such that surface water will not collect at the base of the disposal site.

The Meadow and Flowell sites have on-site trenches used for waste disposal. Closure for these sites includes the placing of waste (excluding auto bodies) into available trenches, and application of final cover. Additional trenches must be excavated if necessary.

Concrete and asphalt debris can be used to cover the compacted material, or to fill onsite trenches, if present. The deposited waste should be covered with two feet of final cover. The final grade of the site should be such that surface water will not collect at the base of the disposal site.

Type II Sites

The Oak City, Scipio, Kanosh and Fillmore sites have been designated as this type. For the Oak City and Kanosh sites, a trench 10 feet deep, thirty feet wide, and the required length should be excavated in a central part of the site. Waste (excluding auto bodies, white goods, farm equipment, etc.) can be placed in the trenches, compacted, and covered with soil excavated from the trenches. Finally, the area should be contoured to divert surface water around the trench site.

Scipio and Fillmore sites may be closed by pushing all waste (excluding car bodies, etc.) to the foot of the present lift, compacting it, and contouring the waste to a moderate grade. Two feet of final cover should be applied. Off-site cover procurement may be necessary at the Scipio site.

Type III Sites

The third type of closure applies to the Leamington, Lynndyl, and Delta sites. The Leamington and Lynndyl sites have natural drainages into which waste has been disposed. It is recommended that all waste (excluding auto bodies, etc.) be pushed into the drainage in use. The waste should then be compacted, covered with a minimum of two feet of soil, and the area contoured to prevent erosion. Ditches will be necessary to divert runoff around the disposal area so that surface water does not contact the disposal area. Waste concrete and asphalt from other sites may be used as riprap to aid in erosion control. Off-site cover procurement will be necessary. Clean up at the Delta site involves pushing all waste (excluding car bodies and white goods) to the northwest end of the site, and into the drainage. Trenches may be excavated at the east end of the site (for a rubble dump) and the excess soil can be used to cover waste in the northwest drainage. The covered waste should be compacted and contoured, and broken concrete and asphalt should be used as riprap, to prevent erosion.

Costs

The cost associated with closure of the open dump sites discussed above is estimated to be $212,700, or approximately $150 per acre. Capital costs are itemized in Table 15, which presents the estimated open dump closure cost for the first operating year. Capital costs have been amortized at 10% over 10 years. Although the estimated time required to close all sites is three years, it was assumed that the County will retain the loader, dump truck, and tractor for landfill use or alternate County projects.

Following field investigation of all open dump sites, it was estimated that, on the average, 1.5 acres of open dump could be closed in one working day. This figure includes travel time, equipment operation at the site, and an 80 per cent efficiency factor for labor and equipment operation. If 1.5 acres per day can be closed, a total of 933 working days (or 7,465 hours) is required for the entire task.

An hourly equipment operating cost of $11.20 per hour was applied to the 7,465 hours, resulting in a cost of $83,600. This $11.20/hour figure reflects equal use of the loader and dump truck, with half-time use of the tractor. The labor cost of $74,700 is based on a $10/hour rate for equipment operators.

Table 15 illustrates capital and operating costs for the first year. Operating costs are based on the labor and equipment operation hours available after waste collection and disposal and equipment maintenance are performed. An assumption of four and one half available workers was made, as the foreman will spend approximately one half of his time performing administrative duties. After deleting vacation hours, 3,075 hours were available for the first operating year for dump closure. As open dump closure phases out, the available labor hours will be needed to accomodate the County's increasing waste load due to population growth.

E. Alternative Management Structures

Three basic institutional alternatives exist for implementing and managing the recommended solid waste managment plan: 1) sole responsibility resting with the County Commissioners; 2) formation of a Solid Waste Advisory Committee, reporting to the County Commissioners; and 3) formation of a special solid waste district. The first alternative would focus all solid waste decision-making authority on the County Commissioners and County administrative personnel. The

TABLE 15

OPEN DUMP CLOSURE COST SUMMARY
1982 CAPITAL COSTS

Item	Unit Cost	Units		Total Cost
Equipment				
Loader	$100,000/unit	1		$100,000
Dump Truck (8-cy)	$45,000/unit	1		$45,000
Tractor (with front-loader)	$15,000/unit	1		$15,000
			TOTAL	$160,000
			AMORIZED[1]	$26,000

1982 OPERATING COSTS

Item	Unit Cost	Units		Total Cost
Equipment Operation				
Loader	$15/hour	1060		$15,900
Dump Truck	$10/hour	1060		$10,600
Tractor	$6/hour	530		$3,200
Labor				
Operators	$10/hour	2,655		$26,600
Mechanic	$10/hour	420		$ 4,200
			TOTAL	$60,500
			TOTAL ANNUAL COST	$86,500

---

[1] Capital costs are amortized at 10 per cent interest over 10 years.

Commissioners would be responsible for financial and budget considerations, ensuring that the system operates properly, and planning for future modifications and expansions.

- The second alternative consists of the formation of a Solid Waste Advisory Board which would be responsible for developing recommendations for financial, operational, and planning needs for solid waste. This Board would consist of members from each of the incorporated and unincorporated areas within the County; representation would be determined on an equitable basis. The Board would meet periodically (on the order of once per month), oversee the solid waste management system, and would report to the County Commissioners on a quarterly or more frequent basis. The County Commissioners would retain ultimate decision-making authority over solid waste management operations in the County.

Establishing a formalized special solid waste district under Article XLV, Section 8 of the Utah Constitution, would be the third institutional alternative. Voter approval would be necessary to establish the district. The district would be administered by a Board of Directors whose members would either be elected by the District populace or appointed by the County Commissioners. The District would have taxation powers, bond-issuing authority, and the power to collect fees. Although the district would be accountable for all aspects of solid waste management, ultimate decision-making authority would remain with the County Commissioners (See Appendix E for a more detailed discussion of Solid Waste Districts). Any of the three management systems described above could be used in conjunction with either public or private operation.

Sole responsibility of the County Commissioners for solid waste management has a major advantage in that County-wide governmental services are consolidated. However, the County Commissioners' responsibilities are presently extensive and are increasing rapidly as a result of the growth occurring in the County. The formation of a Solid Waste Advisory Board would delegate some of the County Commissioners' workload to the Board. The Board's membership structure would ensure that each town/area within the County has input into the solid waste management sytem. Additionally, the Board's members would acquire experience in solid waste issues, resulting in a well-managed County-wide system.

Districts have the advantage of establishing financial autonomy for the solid waste management system from other competing County demands for funds. Theoretically, a district would be the most efficient institutional system, as the sole purpose of the district is to manage solid waste operations. The disadvantages of a district would include: uncertainity regarding the formation of a district, as voter approval is required; need for significant time to implement a district (usually ranging from 6 months to two years or greater); and addition of another distinct level of taxing authority to the County.

The second alternative, the formation of a Solid Waste Advisory Board, is the recommended institutional method, as it combines most of the positive features associated with the direct County Commissioner and district alternatives, and alleviates many of the problems. It eliminates the uncertainity associated with voter approval, expedites implementation of the County's solid waste management system, and offers a sound management resource to the County Commissioners. Furthermore, this alternative is flexible, as the Solid Waste Advisory Board could provide the nucleus of a solid waste district if a decision is made to choose that option in the future.

One of the first actions of the Solid Waste Advisory Board should be the hiring of a full-time, professional General Manager. The General Manager will manage the day-to-day operations of the system, be responsible for the budget, and be an expert in collection and disposal techniques. The General Manager would be responsible to, and report directly to, the Solid Waste Advisory Board. The following schematic illustrates the proposed institutional structure:

County Commissioners

Solid Waste Advisory Board - County Administrator

General Manager

Collection and Disposal Personnel

The General Manager would preferably have experience in an administrative/supervisory capacity in a comparable position. Technical expertise in solid waste collection and disposal and working knowledge of state and federal solid waste regulations is preferred, but administrative, organizational, and supervisory skills are more important. Specific duties of the General Manager are outlined below:

- Overall system administration and operation;
- Work scheduling;
- Facility inspections;
- Hiring, supervision, and training of employees;
- Public relations;
- Record keeping;
- Budgeting/cost accounting;
- Safety considerations.

The General Manager should be hired at the initiation of the implementation phase as this employee is the focal point for all solid waste activities.

It is recommended that the system be operated by the County rather than through a lease or contractural agreement with a private operator. Historically, public solid waste operations have been regarded as being less expensive than private operations (due to a tax free and non-profit status) and more responsive to public demands. Private operations, particularly in the collection area, have increased significantly in the last few years. In many cases, private operations are considered to be more efficient.

Millard County's solid waste system, if implemented, managed, and operated properly, should be less expensive operated publically rather than privately. No private operators currently exist in the area with the size and expertise to handle Millard County's system. Additionally, implementing a new system such as Millard County's would entail a high risk on the part of a private operator. A County-run operation would provide more flexibility, better public relations (eductional and awareness programs), and better enforcement of solid waste ordinances through the County Sheriff's office. Flexibility is available within the recommended plan for contracting out portions of the solid waste operations if the Solid Waste Advisory Board and General Manager determine that it is appropriate.

One very necessary element of a solid waste management system is a solid waste ordinance which provides a mechanism for controlling the collection and disposal of all solid wastes within the County. Consequently, the ordinance must be carefully drafted to include all the essential ingredients for Millard County's system. The Sheriff's office should be responsible for enforcement of the ordinance.

The ordinance should address such items as the powers and duties of the Solid Waste Advisory Board and the General Manager, time and frequency of collection for various types of wastes, wastes allowed and prohibited from certain containers, fees, etc. A model ordinance which can be utilized by Millard County as a guideline for developing its own specific ordinance is included as Appendix G. The provisions regarding special wastes detailed previously in this Chapter should be incorporated into the County's ordinance.

F. Alternative Financing Strategies

The general financing alternatives available to the County are described in Appendix E. These methods include the use of current revenue, long-term borrowing, leasing, or obtaining state or Federal assistance. When the Solid Waste Plan is near the implementation stage, a financial consultant may be required to provide detailed financial planning assistance. However, some observations and recommendations can be made at this time. The sources of funding will be discussed according to applicability to capital and operating expenditures.

Capital Costs

Potential sources for capital expenditures are current County revenue (a sales tax, property tax, special assessment tax, or IPP impact funds), or revenue or general obligation bonds. Property taxes will be utilized to some extent, as current County general funds will probably be necessary to assist in covering initial capital costs.

An increase in property taxes is felt by County officials to be an inequitable method of financing solid waste, as property owners pay a disproportionate share of the expense. A special assessment tax is possible, if a solid waste district is established. However, at this time, a district is *not recommended* for the County. In the future, the County may wish to organize a district and obtain taxing authority.

Funds may be available through receipt of IPP "impact funds," which are derived from a use tax levied on the facility. The County estimates that it will receive $150,000 to $200,000 for 1982, which is designated for a County jail project. Future impact funds may be available for solid waste financing, as the County has indicated that it is a high priority.

Long-term borrowing may be necessary. At the present time, the County has nearly reached its limit for general obligation bonding, as bonding has occurred for the proposed jail and courthouse. However, the County's assessed valuation will increase in 1983. County officials feel that bonding to finance a solid waste project might not receive public support at this time. A revenue bond, pledging user fees for repayment, could also be used, although this type of bond has historically been more difficult to market.

State or Federal funding assistance is not available for solid waste projects currently, or in the near future, as both Federal and State governments have directed all funds to hazardous waste management efforts. Leasing equipment is one means to reduce initial capital outlays, and is currently quite advantageous for the public sector, due to the Economic Recovery Tax Act of 1981. This option should be explored by the County.

Operating Costs

The most probable source of funds for these expenses is current revenues from the County's general fund. It is recommended that user fees be collected, enabling a fairly equitable distribution of charges. Residential users would be charged a household fee based on the percentage of collection and disposal costs associated with residential waste (both compactable and bulky). Commercial accounts could be charged an equivalent fee per greenbox, based upon the frequency of service. The rate structure will be established by the general manager and Solid Waste Advisory Board. However, the rate should be increased by the current inflation rate, yearly. It is necessary to charge generators of large quantities of bulky wastes a disposal fee for rubble dump use. One method would be the addition of a Solid Waste fee to the current building permits which are required in the County.

Residential users should be billed quarterly or yearly, in order to minimize billing costs. Incorporated areas could utilize each city or town's current billing system. For example, a solid waste fee could be added to the sewer and water bill. This would involve the city governments in the solid waste system and consolidate billing duties, which should decrease expenses. Residential users living in unincorporated areas of the County would be billed yearly, possibly by including a bill with tax notices.

Commercial accounts would be billed monthly or quarterly by the County. The secretary included in the staff requirements would be responsible for this task. This County billing system may be used for all residential users, if the previously described billing methods are not practical. The user fee could be adjusted to a rate higher than the actual collection and disposal costs, in order to generate excess revenue for future capital expenditures. These revenues should be maintained separately from the general fund, if this occurs.

In conclusion, the system's initial capital costs would be most optimally financed through IPP impact funds, supplemented by other revenues in the County's general fund. As the assessed valuation in the County is increasing, these sources may prove adequate. If not, a general obligation bond is probably the most practical additional source. User fees should be charged to generate funds for amortized capital and operating expenses.

Cost Summary

The costs incurred by the County to operate the recommended system consist of collection, disposal, and open dump closure expenditures. However, for approximately six months before the system is in full operation (and generating revenue through user fees), certain expenditures related to plan implementation will be required. These costs, summarized in Table 16, include site development

TABLE 16

IMPLEMENTATION COSTS

Item	Unit Cost	Units	Total Cost
Site Development			
Roll-off System			
Land (.25 acre/site)	$1,000/acre	2.25	$2,300
Grading, Gravelling, Ramp Construction	$5,000/site	9	$45,000
Regional Landfill			
Road Grading, Gravelling[1]	$10,000/mile	0.3	$3,000
Drainage Ditches[2]	\$.25/yd^3	800	$200
Shelter[3]	$75,000/unit	1	$75,000
Fencing			
Stock	$2.30/ft.	9250	$21,300
Litter[4]	$11/ft.	150	$1,700
Gates	$500/unit	2	$1,000
Wells (monitoring)	$500/unit	2	$1,000
Bulky Waste Site			
Road Grading, Gravelling	$10,000/mile	0.3	$3,000
Drainage Ditches	\$.25/yd^3	1,200	$300
Shelter (400 sq. ft.)	$8,500/unit	1	$8,500
Fencing (stock)	$2.30/ft.	3,300	$7,600
Gate	$500/unit	1	$500
Wells	$500/unit	2	$1,000
		SUBTOTAL	$171,400
Engineering Fees[5]	-	Lump Sum	$17,100
Administrative Costs			
General Manager	$14.50/hr.	1,040	$15,100
Foreman	$12/hr.	1,040	$12,500
Secretary	$8/hr.	1,040	$8,300
		TOTAL	$224,400
		AMORTIZED[6]	$ 36,500

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[1] 30 feet wide, one foot depth of gravel.
[2] Ditches are two feet deep.
[3] Garage and Office, 3,000 sq. ft.
[4] Ten feet high, 30 foot sections.
[5] 10% site development costs.
[6] Amortized at 10 per cent interest over 10 years.

expenses and administrative salaries. These costs have been displayed separately to emphasize their significance, as they are large enough to delay operation of the system. These costs have been amortized at 10 per cent interest over 10 years.

Table 17 summarizes the capital and operating expenses for the first operating year, after collection and disposal systems are in place. The total cost of \$429,900 can be used to estimate user fees.

In determining a fee for residential users, a total County household quantity of 2,475 was used. This incorporates the 1980 census figure of 2,255 housing units, and reflects a 30 per cent increase in housing units in Delta and Hinckley from 1980 to 1982 (as indicated by County officials). No growth estimates for the remainder of the County was made. In Chapter III, it was assumed that 44 per cent (by weight) of the total County waste stream was contributed by residential users. The approximate cost per year per household would then be:

$$\frac{(\$429{,}800)\ (.44)}{(2{,}475\text{ households})} = \$76\text{/year or about }\$6.30\text{/month}$$

This cost assumes payment of both capital and operating costs by user fees. If operating costs alone are used to estimate a residential user fee, the rate is \$48 per year, or \$4 per month. This cost will decrease as the number of residents increases. An annual commercial rate can be established by dividing the commercial fraction of the total annual cost (32 per cent) by the total number of establishments requiring service, when this information becomes available. As mentioned previously, private contractors should be charged for collection and/or disposal of demolition/construction debris, possibly by adding a solid waste fee to the building permit.

The solid waste management system has been designed to meet both 1982 and 1987 (peak year) requirements for equipment and labor, with a minimum of excess capacity or additional capital expenditures. The total County population is estimated to increase by 56 per cent from 1982 to 1987, then decline by 17 per cent from 1987 to 1990, and increase by 28 per cent from 1990 to the year 2000

TABLE 17

SOLID WASTE MANAGEMENT PLAN
MILLARD COUNTY, UTAH
TOTAL ANNUAL COST SUMMARY
1982 CAPITAL COSTS

Item		Total	Amortized[1]
Implementation		$224,400	$36,500
Collection		$405,500	$66,000
Disposal		$202,000	$32,900
	SUBTOTAL	$831,900	$135,400
Open Dump Closure		$160,000	$26,000
	TOTAL	$991,900	$161,400

OPERATING COSTS

		TOTAL
Collection		$87,200
Disposal		$59,900
Open Dump Closure		$60,500
Administrative Costs		
Labor		
General Manager		$30,200
Foreman[2]		$12,500
Secretary		$16,600
Billing		$1,500
		$268,400
	TOTAL	$429,800

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[1] Amortized at 10 per cent interest over 10 years.
[2] Remainder of salary is included in disposal costs.

(see Figure 1-A). The total population increase from 1987 to 2000 is estimated at six per cent.

Some general projections may be made concerning the expected cash flow during the 20-year study period. After the initial capital investment in 1982, the amortized capital cost will remain constant for ten years, the estimated average life of the equipment. It will be necessary to purchase additional greenbox and roll-off containers during this time period. A relatively high amount of maintenance time has been built into the system to maximize equipment life. In approximately ten years, the tilt-frame vehicle and one side-loading vehicle will need to be replaced, as well as most landfill equipment.

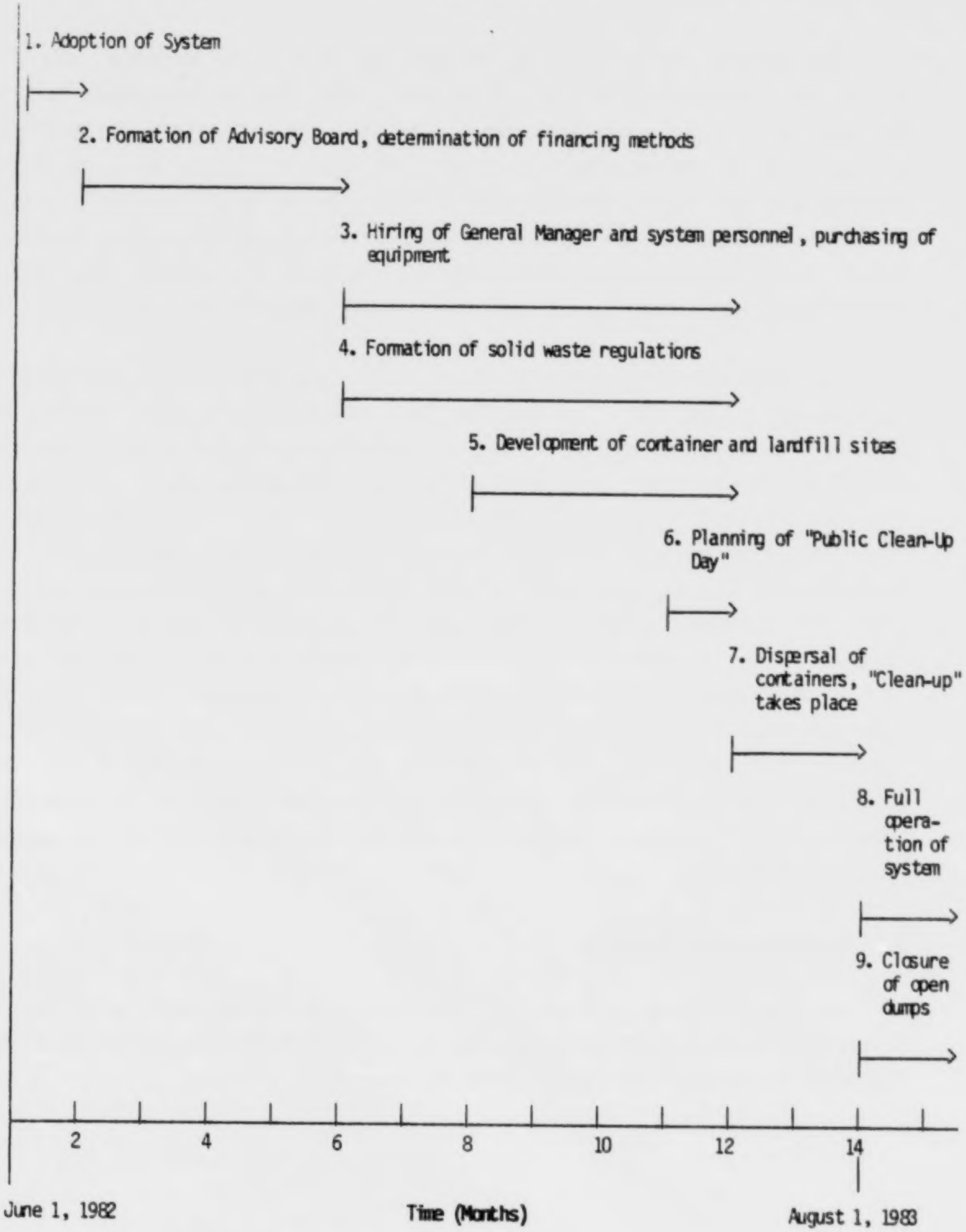
The operating costs involved in collection and disposal are estimated to increase by 51 per cent from 1982 to 1987. An operating cost increase was derived from averaging the operating cost increases in Options 2 and 4 described in Chapter V, which are most similar to the recommended plan. (Appendix E contains cost estimates for greenbox and roll-off collection, landfill operation, etc., for Options 1 through 5.) From 1982 to approximately 1985, the available man and equipment hours will be utilized in waste collection and disposal, and open dump closure. When open dump closure is complete, the extra capacity in the system will shift to collection and disposal. The peak year, 1987, will require efficient operation, with some overtime. After 1987, the labor and equipment needs will decrease, and one less full-time employee will be needed from approximately 1988 to 1995. By the year 2000, equipment and labor needs, and the corresponding operating costs, should build up to beyond the "peak" year requirements. However, the cost per capita will decrease as population increases.

G. Implementation Schedule

The steps required to reach full operating capacity are outlined below. An approximate timetable is provided, which lists starting and finishing dates. Figure 20 illustrates the steps, which may overlap or coincide.

FIGURE 20

IMPLEMENTATION SCHEDULE
SOLID WASTE MANAGEMENT PLAN
MILLARD COUNTY, UTAH



		Time (Months)	
		Start	Finish
1.	The County and municipalities make a collective decision at a public meeting on adoption of the system (participation, city and County roles, etc.)	0	2
2.	The Solid Waste Advisory Board is established and financing methods are determined.	2	6
3.	A General Manager is hired. The Manager hires additional personnel and purchases collection and landfill equipment.	6	12
4.	County-wide solid waste regulations are established and adopted.	6	12
5.	Container and disposal sites are located, and preparatory work performed by personnel. Engineering work is done on landfill sites, and a contract negotiated for building construction. Present Fillmore and Delta disposal sites are upgraded to receive bulky waste.	8	12
6.	A "Public Clean Up" day is planned, in order to remove in-place bulky waste from residences before the system is fully implemented.	11	12
7.	Collection containers (greenboxes and roll-offs) are dispersed first in West Millard, then in East Millard. The clean up day takes place and waste is disposed of at the Delta and Fillmore bulky waste sites.	12	14
8.	The system is in full operation, with disposal at the Southeast Delta site, Fillmore site, and present Delta disposal site.	14	--

		Time (Months)	
		Start	Finish
9.	Present open dumps are closed for public use. Clean up of remaining open dump sites occurs, in the following order; Hinckley, Lynndyl, Oak City, Scipio, Holden, Kanosh, Meadow, Flowell, Sutherland-Sugarville, Deseret-Oasis, Deseret, Delta.	14	50

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APPENDIX A

STATE OF UTAH
CODE OF SOLID WASTE DISPOSAL
REGULATIONS

UTAH STATE DEPARTMENT OF SOCIAL SERVICES
DIVISION OF HEALTH

CODE OF SOLID WASTE DISPOSAL REGULATIONS

Adopted by
Utah State Board of Health
Under Authority of
26-15-5, U.C.A., 1953, As Amended,
July 17, 1974

CERTIFIED OFFICIAL COPY
UTAH STATE BOARD OF HEALTH

By Lyman J Olsen MD
Secretary

Effective Date August 14, 1974

FOREWORD

These regulations are for the purpose of establishing minimum requirements for the disposal of solid wastes in Utah. The term "solid wastes" means garbage, trash and other wastes generated by daily living processes and also includes those produced in commercial, industrial and agricultural operations.

The growing volume of these wastes and the often haphazard methods of getting rid of them have resulted in rapid multiplication of the associated problems through the years, until it became obvious in Utah, as across the nation, that a positive management program would be essential.

Open dumping and intermittent burning of solid wastes, particularly those of municipal origin, has been the pattern in the past, leading to the increasingly undesirable effects of fly and rodent breeding, air pollution, water pollution, and aesthetic blight. This undesirable method of disposal has resulted partly from lack of specific controls and partly because of a relatively low cost.

While it is acknowledged that compliance with these regulations will result in added expense to local government and others involved, it is considered essential to proceed without delay in correcting the obvious problems which now exist in many areas of the State. An added benefit will be the opportunity of conserving the nations natural resources through recycling of useable materials.

The regulations are based on Statutory Authority and responsibility conferred by Section 26-15-5, UCA, 1953, as amended, and are enforceable throughout the State. They are designed for adoption and enforcement by local health departments in cooperation with the State Division of Health.

In adopting these regulations, the State Board of Health acknowledges a need for time to bring existing facilities up to standard and has instructed the staff to work cooperatively in development of reasonable construction schedules, with limits which assure elimination of existing hazards and environmental blights without undue delay, but which also recognize the difficulties faced by local governments in raising funds and developing regional solutions to problems.

CODE OF SOLID WASTE DISPOSAL REGULATIONS

DEFINITIONS

The following definitions shall apply in the interpretation and enforcement of this code.

Board means the Utah State Board of Health

Division means the Utah State Division of Health

Hazardous Wastes means all waste materials considered to be excessively toxic or poisonous, corrosive, irritating or sensitizing, radioactive, biologically infectious, explosive or flammable, or other materials as determined by the Board.

Person includes bodies politic and corporate, partnerships, associations and companies.

Shall is used to indicate mandatory requirements.

Solid Wastes includes hazardous wastes and means any discarded organic matter, garbage, refuse, trash, and other solid materials resulting from industrial, commercial, recreational and agricultural operations and from community activities, and shall include liquid or semi-liquid wastes accumulated in vehicle waste tanks or transported by tank truck or other similar means.

INDISCRIMINATE DUMPING

1. It shall be unlawful for any person to deposit any solid waste in any place except at a site which has been designated by a city, county, district or other properly designated agency, and approved by the Utah State Division of Health. This requirement does not include the deposition of inert construction debris used as fill material or mine tailings and overburden, provided such deposition does not cause a public nuisance or hazard or contribute to air or water pollution.

APPROVAL REQUIRED

2. No solid waste disposal site shall be constructed or operated without the approval of the Division.

SUBMISSION OF PLANS

3. Design plans and related information shall be submitted to the Division for review and approval prior to the construction of any solid waste disposal site. Such plans shall include the following:

(a) A plat, map or aerial photograph upon which is accurately shown the exact location of the proposed disposal site, current land use, zoning within 1/4 mile of the site, any homes, industrial buildings, wells, watercourses, surface drainage channels, rock outcroppings, roads and general topography.

(b) A report including the following details:

   (1) Population and area to be served by the proposed site.

   (2) Total area of the proposed site.

   (3) Special provisions for handling special and/or hazardous wastes.

   (4) Anticipated type, quantity and source of solid waste to be deposited in the site.

   (5) Soil description to a depth of at least five feet below the proposed excavations, maximum ground water elevations throughout the site and a general description of geology of the area. Such data shall be obtained by soil borings, trenching or other appropriate means.

   (6) Availability, source and characteristics of cover material.

   (7) Type and availability of equipment for efficient excavating, earth moving, spreading, compaction and other needs.

   (8) Provisions for fire control, which may include arrangements made with the nearest fire department to control any fires which may occur at the site.

   (9) Evidence of year-round accessibility to the site, to include an all-weather road.

   (10) Proposed fencing for control of access as well as prevention of scattering of waste material by wind.

   (11) Evidence of land ownership or lease agreement.

   (12) Any other information specifically requested by the Division.

PLAN APPROVAL

4. Upon approval of the plans and supporting information, persons concerned will be notified in writing by the Division. Approval will include appropriate limitations on types of waste to be accepted. Construction shall not be started prior to receipt of the written approval.

5. Plan approval will depend, in part, upon adequate isolation, avoidance of excessively irregular topography, groundwater elevations, extremely pervious soil formations, surface rock formations and outcroppings, and close proximity to natural drainage channels. At least five feet of separation between the bottom of disposal trenches and the highest groundwater elevation is desireable. Exceptions to this rule will be considered on individual merit but only where the site can be so modified as to demonstrably preclude any wetting of deposited waste by groundwater.

SITE OPERATION

6. Each disposal site shall be operated as follows:

   (a) At least six inches of earth shall be placed after each operating day over all waste material after compaction to the smallest practical volume. A minimum of two feet of earth shall be placed over any completed segment of the site. Final grading shall provide effective surface drainage.

   (b) The working face shall be limited to the smallest area practical to confine the amount of exposed waste without interfering with effective operation procedure.

   (c) Adequate equipment for trenching, compacting and covering shall be available and in operating condition.

   (d) Qualified personnel shall be at the site to supervise activities during all hours of scheduled operation.

   (e) Open burning shall not be permitted.

   (f) Adequate fire protection shall be provided. This may include arrangements made with the nearest fire department to control any fires which may occur at the site.

   (g) Litter control along access roads and at the site shall be accomplished by clean-up of the areas as often as necessary to prevent unsightly conditions caused by blowing paper and other misplaced refuse.

   (h) Provisions for dust control at the site and along access roads shall be implemented as necessary.

(i) The supervisor or other appropriate person shall keep records of the amounts of solid wastes accepted. This may be done by estimating area filled at the site, by measuring the volume of waste deposited, or by weighing material brought to the site. The amount and location of area completed shall be recorded and kept on file.

(j) Appropriate rodent and insect control procedures shall be implemented as necessary.

HAZARDOUS AND SPECIAL WASTES

7. If hazardous or special wastes are accepted at the site, proper provisions shall be made for handling them. These provisions shall include, where necessary, a separate area for disposal of the wastes, designated by appropriate signs.

8. Hazardous wastes shall be covered immediately after dumping in the designated area, with a minimum of six inches of cover material to avoid danger to persons permitted in the area.

9. Certain bulky wastes, such as automobile bodies, furniture and appliances should be crushed and then pushed onto the working face near the bottom of the cell or into a separate disposal area. Other bulky items, such as demolition and construction debris, tree trunks or stumps and large timbers, should be pushed onto the working face near the bottom of the cell or into a separate disposal area.

10. Dead animals received at the site should be deposited onto the working face at or near the bottom of the cell with other solid wastes, or into a separate disposal area provided they are covered immediately with six inches of earth to prevent odors and the propagation and harborage of rodents and insects.

11. Water treatment plant and digested wastewater treatment plant sludges containing no free moisture should be placed on the working face and covered with municipal solid wastes. Raw wastewater treatment plant sludges shall be classed as hazardous wastes and shall be handled accordingly.

PHASING OUT OPEN DUMPS

12. Abandoned open dumps shall be closed in accordance with the following requirements:

    (a) Absence of rats and other vermin shall be positively established. When rats or other vermin are present, an extermination procedure shall be established and carried out by qualified individuals prior to closing.

    (b) All fires shall be extinguished before final cover of earth is applied.

(c) All solid waste shall be consolidated, compacted and covered with at least two feet of suitable cover material.

(d) The final grading shall be accomplished to provide proper surface drainage and to avoid ponding.

(e) If feasible, the area should be planted with grass or other vegetation.

OTHER PROCESSES, METHODS, AND EQUIPMENT

13. Processes, methods, and equipment other than those specifically addressed in this Code will be considered on an individual basis by the Division of Health upon submission of evidence of adequacy to meet environmental quality criteria.

APPENDIX B

UTAH STATE DIVISION OF HEALTH

SAMPLE

SOLID WASTE DISPOSAL SITE

INSPECTION FORM

Utah State Division of Health

Solid Waste Disposal Site Inspection Form

Date: Day [1] [6] Month [1] [0] Year [7] [9]

Name of Person Completing Form: Jim Salmon & Dennis Downs

General Characteristics

Name of Site: Hinckley - Millard County

Location of Site:

Land Owner:

Operator of Site:

Local Health Jurisdiction Central Utah Health District

Communities or Industries Served:

Estimated Population Served: [ ] [ ] [ ] [ ] [ ] [ ]

Type of Disposal Site: Land ☒ Incinerator ☐

Other ☐

Total Acreage of Disposal Site [ ] [ ] [ ]

Area Remaining: [ ] [ ] [ ] Acres

Topography of Site:
Quarry or Borrow Pit ☐ Gully-Canyon ☒
Level Areas ☒ Hillside ☐
Marsh or Floodplain ☐ Other ☐

Predominant type of Soil:
Rock ☐ Gravel ☐
Clay ☒ Sand ☒
Loam ☐

Hazardous Waste

	Yes	No
Hazardous Wastes Accepted at the Site:	☐	☐
Site Approved for Hazardous Waste Disposal:	☐	☐
Hazardous Waste Properly Handled and Covered:	☐	☐
Adequate Records Kept:	☐	☐
Separate Hazardous Disposal Area:	☐	☐
Access Controlled:	☐	☐

Quantities of Hazardous Wastes Received: UNKNOWN

Operation

Days and Hours of Operation: 24 hour / day

Material Disposed:

Garbage	☒	Industrial Waste	☐
Trees	☒	Rubbish	☒
Auto Bodies	☒	Dead Animals	☒
Septic Tank Sludge	☐	Construction Debris	☒
		Incinerator Ash	☒
Milled or Baled Refuse	☐	Other	☐

	Yes	No
Daily Cover:	☐	☒

Frequency of Cover: Never

	Yes	No
Refuse Compacted Before Covering:	☐	☒

Type of Equipment Available:

Tractor Crawler	☐	Grader	☐
Compactor	☐	Dragline	☐
Other Type	☐	None	

	Yes	No
Access Roads Maintained in Good Condition:	☒	☐
Litter Absent On Approach Road:	☐	☐
Litter Absent On-Site:	☐	☒
Directional Signs Adequate: On-Site	☐	☒
To Site	☐	☒
Personnel Present During Hours of Operation:	☐	☒
Facilities Available for Personnel:	☐	☒
Salvaging Not Permitted:	☐	☒
Salvaged Materials Not Accumulated:	☐	☒
Site Adequately Fenced:	☐	☒
Adequate Gate:	☒	☐

Environmental Protection

Vector Problems Evident: Rats ☐ Flies ☒ Mosquitoes ☐ Birds ☐ Other ☐

Other Problems Evident: Dust ☒ Odors ☒ Blowing Paper ☒ Improperly Covered Dead Animals ☒

Open Burning Prohibited: Yes ☐ No ☒

Fire Protection: None ☒ Water ☐ Firebreak ☐ Other ☐

Water Sources Adequately Protected: Yes ☐ No ☐ UNKNOWN

Water Sources Which Are Not Adequately Protected:

Surface Water ☒ Ground Water ☐

Intermittant Drainage ☒ Spring ☐ Well ☐ Other ☐

UNKNOWN

Distance in Feet to Nearest: Surface Water [ ] [ ] [1] [5]

Intermittant Drainage [ ] [ ] [ ] [0] Spring [ ] [ ] [ ] [ ]

Well [ ] [ ] [ ] [ ] Other [ ] [ ] [ ] [ ]

General Appearance: Sightly [ ] Unsightly [X]

Site Location and Design Approved by State Division of Health Yes [ ] No [X]

Remarks ____________________

APPENDIX C

POTENTIAL LANDFILL
SITE LOCATION AND EVALUATION

POTENTIAL LANDFILL SITE LOCATION AND EVALUATION[1]

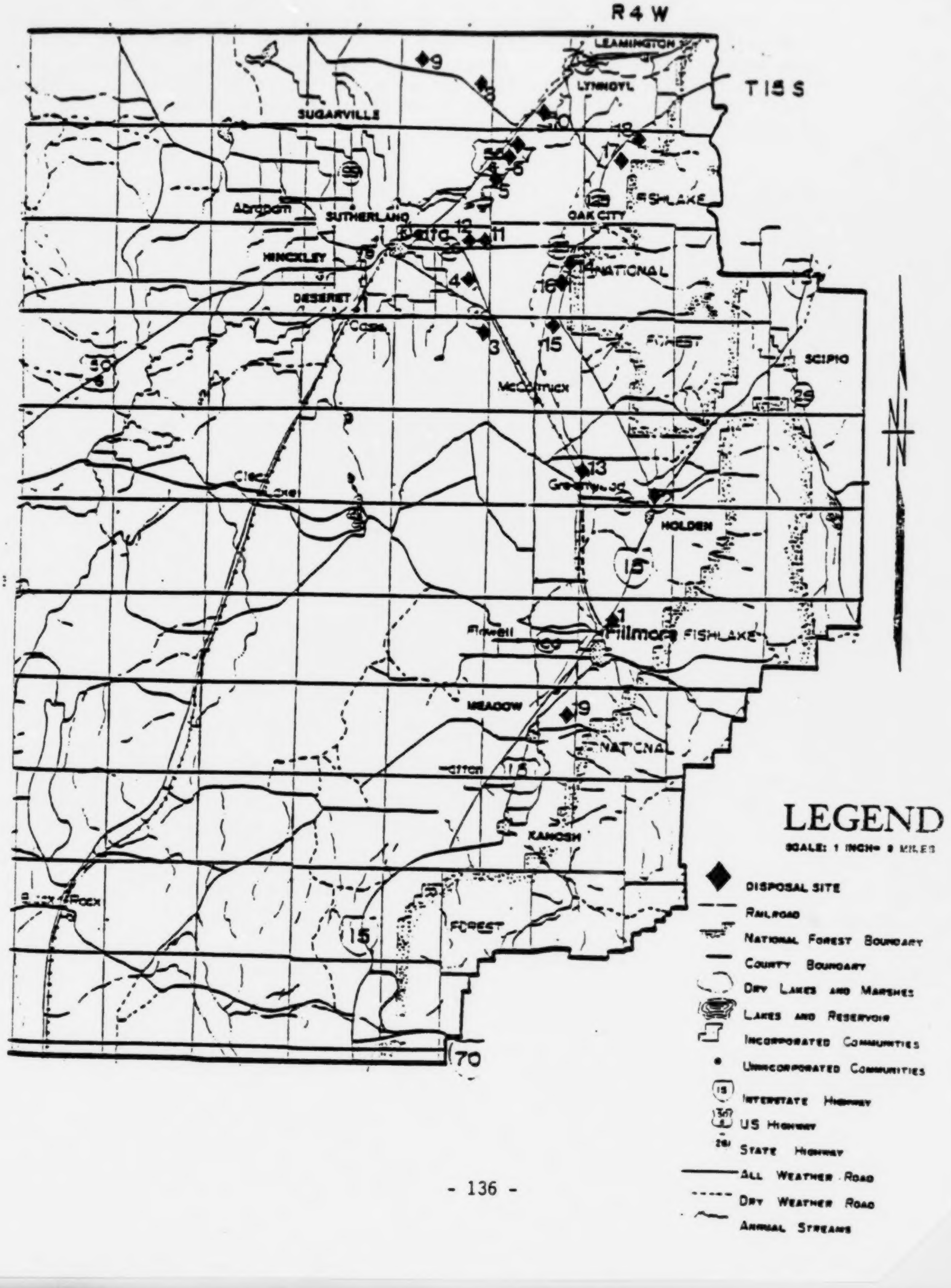
Site	Location	Eliminating Factor
1	T.21S., R.4W., S.16, S 1/2, SW 1/4, SE 1/4	None
2	T.19S., R.4W., S.35, N 1/2, NW 1/4	None
3	T.18S., R.6W., S.1, NE 1/4, NE 1/4 and SE 1/4, NE 1/4	None
4	T.17S., R.6W., S.23, NW 1/4, NE 1/4 and SW 1/4, NE 1/4	None
5	T.16S., R.6W., S.13, SE 1/4	None
6	T.16S., R.5W., S.7, SE 1/4	Soil
7	T.16S., R.5W., S.5, E 1/2	Haul Distance
8	T.15S., R.6W., S.35, N 1/2	Soil
9	T.15S., R.6W., S.29, N 1/2	Soil
10	T.15S., R.5W., S.33. NE 1/4	Haul Distance
11	T.17S., R.5W., S.7, W 1/2	Soil
12	T.17S., R.6W., S.12	Soil
13	T.19S., R.5W., S.25, N 1/4	Soil
14	T.17S., R.5W., S.12, SW 1/4	Haul Distance
15	T.18S., R.5W., S.3, E 1/2	Soil
16	T.17S., R.5W., S.23, NE 1/4	Soil
17	T.16S., R.4W., S.8, SE 1/4, SE 1/4	Topography
18	T.16S., R.4W., S.9, NW 1/4	Topography
19	T.22S., R.4W., S.13, E 1/2	Access

---

[1] The accompanying map shows the approximate location of the sites investigated. Eliminating factors are discussed in Chapter IV of the text.

For example, soils were unsuitable in many locations due to their clean sandy texture, which is conducive to leachate migration and is not satisfactory cover material. Poor access (road conditions) and long haul distances led to lower economic feasibility for other sites. Excessively steep topography, only evident after field investigation, was also prohibitive in some areas. Although these sites may demonstrate several other limiting factors, the primary factor has been noted in the evaluation table.

POTENTIAL DISPOSAL SITES
Millard County, Utah


R 4 W
T 15 S
LEAMINGTON
LYNNDYL
SUGARVILLE
Abraham
SUTHERLAND
Delta
HINCKLEY
DESERET
Oasis
OAK CITY
FISHLAKE
NATIONAL
FOREST
SCIPIO
McCormick
Greenwood
HOLDEN
Clear Lake
Flowell
Fillmore
FISHLAKE
MEADOW
NATIONAL
Hatton
KANOSH
Black Rock
FOREST
9
8
10
18
17
5
6
5
12
11
4
14
16
3
15
13
1
19
15
70
LEGEND
SCALE: 1 INCH = 8 MILES
DISPOSAL SITE
RAILROAD
NATIONAL FOREST BOUNDARY
COUNTY BOUNDARY
DRY LAKES AND MARSHES
LAKES AND RESERVOIR
INCORPORATED COMMUNITIES
UNINCORPORATED COMMUNITIES
INTERSTATE HIGHWAY
US HIGHWAY
STATE HIGHWAY
ALL WEATHER ROAD
DRY WEATHER ROAD
ANNUAL STREAMS

APPENDIX D

GLOSSARY

GLOSSARY[1]

Abandoned Motor Vehicle—A motor vehicle that applicable laws deem to have been abandoned.

Aerobic—The biological state of living and growing in the presence of oxygen.

Aggregate—Crushed rock or gravel screened to size for use in road surfaces, concrete, or bituminous mixes.

Alkalinity—The measurable ability of solutions or aqueously suspended solids to neutralize an acid.

Anaerobic—The biological state of living and growing in the absence of oxygen.

Angle of Repose—The maximum acute angle that the inclined surface of a pile of loosely divided material can make with the horizontal.

Aquifer—Geologic formation that has a structure that permits appreciable water to move through it under ordinary field conditions.

Backfill—The material used to refill a ditch or other excavation, or the process of doing so.

Baler—A machine used to compress and bind solid waste or other materials.

Bearing Capacity—The maximum load that a material can support before failing.

Biodegradable—Capable of being decomposed by microorganisms.

Blade

Earth—A heavy broad plate that is connected to the front of a tractor and is used to push and spread soil or other material.

Landfill—A U-blade with an extension on top which increases the volume of solid wastes that can be pushed and spread by the tractor and protects the operator from any debris thrown out of the solid waste.

U-Blade—A dozer blade that protrudes forward at an obtuse angle to the blade, enabling it to handle a larger volume of solid waste than a regular blade.

Bucket—An open container affixed to the movable arms of a wheeled or tracked vehicle to spread solid waste and cover material, and to excavate soil (bucket loader).

Bull Clam—A hinged curved bowl on the top of the front of the blade of a tracked vehicle.

Bulldozer—A tracked vehicle equipped with a blade.

Capillary Water—Underground water that is held above the water table by capillary attraction.

Carbon Dioxide (CO_2)—A colorless, odorless, and nonpoisonous gas that is produced during the thermal degradation and microbial decomposition of the organic fraction of solid wastes.

Cell—Compacted solid wastes that are enclosed by natural soil or cover material in a sanitary landfill.

Cell Height—The vertical distance between the top and bottom of the compacted solid waste enclosed by natural soil or cover material in a sanitary landfill.

Cell Thickness—The perpendicular distance between the cover materials placed over the last working face of two successive cells in a sanitary landfill.

Chipper—A size-reduction device having sharp blades attached to a rotating shaft (mandrel) that shave or chip off pieces of certain objects, such as tree branches or brush.

Clay—A fine-grained soil having liquid limits and plasticity indexes that plot above the A-line on the Unified Soil Classification System plasticity chart.

Compactor—A vehicle with a blade and with steel wheels that have load concentrators to provide compaction and a crushing effect.

Compost—Relatively stable decomposed organic material used to fertilize and condition soil.

Cover Material—Soil that is used to cover compacted solid waste in a sanitary landfill.

Cut—Portion of a land surface or an area from which earth or rock has been or will be excavated; the distance between an original ground surface and an excavated surface.

Cutoff Trench—A trench that is filled with material that is impermeable or very permeable to the flow of gas or water. The barrier is used to prevent the movement of gas or

[1] American Society of Civil Engineers. Sanitary Landfill. New York: ASCE Solid Waste Management Committee of the Environmental Engineering Division, 1976.

water or to intercept them and to direct them to another location (see *Gas Barrier*).

Demolition Waste—See *Waste, Construction and Demolition.*

Density (Sanitary Landfill)

Actual Refuse Density = weight of solid waste/volume of solid waste.

Apparent Refuse Density = weight of solid waste/volume of solid waste and soil.

Fill Density or Combined = weight of solid waste and soil/volume of solid waste and soil.

Dragline—A revolving shovel with a bucket attached only by cables that digs by pulling the bucket toward itself.

Drainage—Provision for directing the runoff that occurs from precipitation or overland flow in such a way as to prevent contact with refuse or interference with landfill operations.

Dumping—An indiscriminate method of disposing of solid waste. To indicate unloading or emptying of a container, use discharging.

Ecology—The science that deals with the interrelationships of organisms and their living and nonliving surroundings.

Effluent—The substances that flow out of a designated source.

Effluent Seepage—Diffuse discharge onto the ground of liquids that have percolated through solid waste or another medium; contains dissolved or suspended materials.

Engine Sidescreen—A rugged screen that fits on the engine housing of a vehicle used at a sanitary landfill to keep paper and other objects from accumulating and damaging the engine.

Environment—The conditions, circumstances, and influences surrounding and affecting the development of an organism or group of organisms.

Face—See *Working Face.*

Field Capacity (of Solid Waste)—The amount of water retained in solid waste after it has been saturated and has drained freely. Also known as moisture-holding capacity.

Fill—See *Sanitary Landfill.*

Fly Ash—All solids, including ash, charred paper, cinders, dust, soot, or other partially incinerated matter, that are carried in a gas stream.

Food Processing Waste—Waste resulting from operations that alter the form or composition of agricultural products for marketing purposes.

Food Waste—Animal and vegetable waste resulting from the handling, storage, sale, preparation, cooking, and serving of foods; commonly called garbage.

Front End Loader—See *Bucket.*

Garbage—See *Food Waste.*

Gas Barrier—Any device or material used to divert the flow of gases produced in a sanitary landfill or by other land disposal techniques (see *Cutoff Trench*).

Grader—A gas or diesel-powered pneumatic-wheeled machine equipped with a centrally located blade that can be angled to case to either side.

Gradient—The degree of slope or a rate of change.

Gravel—Rock fragments from 2 mm–64 mm (0.08 in.–2.5 in.) in diameter; gravel mixed with sand, cobbles, boulders, and containing no more than 15% of fines.

Grinding—The mechanical pulverization of solid waste (see *Shredding*).

Ground Water—Water that occupies the voids within a geologic stratum.

Ground-Water Runoff—That part of the ground water which is discharged into a stream channel as spring or seepage water.

Grouser—A ridge or cleat that extends across a crawler tractor track to improve its traction.

Grout—A cementing or sealing mixture of cement and water to which sand, sawdust, or other fillers may be added.

Hammermill—A broad category of high-speed equipment that uses pivoted or fixed hammers or cutters to crush, grind, chip, or shred solid wastes.

Hardpan—A hardened, compacted, or cemented soil layer.

Haul Distance—The distance that cover material must be transported from an excavation or stockpile to the working face of a sanitary landfill.

Household Solid Waste—See *Solid Waste, Residential.*

Humus—Decomposed organic material.

Hydrogen Sulfide (H_2S)—A poisonous gas with the odor of rotten eggs that is produced from the reduction of sulfates in and the putrefaction of a sulfur-containing organic material.

Hydrology—Science dealing with the properties, distribution, and flow of water on or in the earth.

Impervious—Resistant to penetration by fluids or gases.

Infiltration—The process whereby some precipitation flows through the surface of the ground.

Interflow—That portion of precipitation which infiltrates into the soil and moves laterally under its surface until intercepted by a stream channel or until it resurfaces downslope from its point of infiltration.

Intermittent Stream—A channel in which water sometimes flows.

Leachate—That liquid which may migrate from within a land disposal site and which has come in contact with the solid waste.

Lift—In a sanitary landfill, a compacted layer of solid wastes and the top layer of cover material. A lift is usually composed of several cells.

Litter—Wantonly discarded material.

Loam—A soft easily worked soil containing sand, silt, and clay.

Lysimeter—A device used to measure the quantity or rate of water movement through or from a block of soil or other material, such as solid waste, or used to collect percolated water for quality analysis.

Manure—Primarily the excreta of animals; may contain some spilled feed or bedding.

Membrane Barrier—Thin layer of material that is impermeable to the flow of gas or water.

Methane (CH_4)—An odorless, colorless, and asphyxiating gas that can explode at a concentration of 5%–15% by volume; can be produced by solid waste undergoing anaerobic decomposition.

Milled Refuse—See Shredded Refuse.

Moisture Content (Solid Waste)—The weight loss (expressed as a percentage) when a sample of solid waste is dried to a constant weight at a temperature of 100° C-105° C.

Moisture Holding Capacity—See Field Capacity.

Moisture Penetration—The depth to which irrigation water or rain penetrates soil before the rate of downward movement become negligible.

Offal—Intestines and discarded parts, including paunch manure, of slaughtered animals.

Open Burning—Uncontrolled burning of wastes in the open or in an open dump.

Open Dump—See Dumping.

Organic Content—Synonymous with volatile solids, except for small traces of some inorganic materials such as calcium carbonate that lose weight at temperatures used in determining volatile solids.

Percentage of Moisture Content (Solid Waste)—The percentage of moisture contained in solid waste; it can be calculated on a dry or wet basis.

Wet = 100 × (water content of sample)/dry weight of sample + water content of sample.

Dry = 100 × (water content of sample)/dry weight of sample.

Percolation—A qualitative term that refers to the downward movement of water through soil, solid waste, or other porous medium.

Permeability—The capacity of a porous medium to conduct or transmit fluids.

pH—Negative logarithm of the hydrogen ion concentration; related to acidity and alkalinity.

Processing—An operation such as shredding, compaction, composting, incineration, or other treatment designed to change the physical form or chemical content of solid waste.

Pulverization—The crushing or grinding of material into small pieces (see *Shredding*).

Putrescible—Organic matter capable of being decomposed anaerobically by microorganisms.

Reclamation—The restoration to a better or more useful state, such as land reclamation by sanitary landfilling, or the obtaining of useful materials from solid waste.

Recovery—The process of obtaining materials or energy resources from solid waste. Synonyms: Extraction, *Reclamation*, *Salvaging*.

Recycling—The process by which waste materials are transformed into new products.

Refuse—See Solid Waste.

Rendering—A process of recovering fatty substances from animal parts by heat treatment, extraction, and distillation.

Reuse—The reintroduction of a commodity into the economic stream without any change.

Roll-On/Roll-Off Container—A large container [15 m^3-30 m^3 (20 cu yd–40 cu yd)] that can be pulled onto a service vehicle mechanically and carried to a disposal site for emptying.

Rubbish—A general term for solid waste, excluding food waste and ashes, taken from residences, commercial establishments, and institutions.

Rubble—Broken pieces of masonry and concrete.

Runoff—That portion of precipitation or irrigation water that drains from an area as surface flow.

Salvaging—The controlled removal of waste materials for utilization.

Sand—A course-grained soil, the greater portion of which passes through a No. 4 sieve, according to the Unified Soil Classification System.

Sandy Loam—A soft easily worked soil containing 0%–20% clay, 0%–50% silt, and 43%–85% sand, according to the United States Department of Agriculture classification code.

Sanitary Landfill—A site where solid waste is disposed of using sanitary landfilling techniques.

Sanitary Landfilling—An engineered method of disposing of solid waste on land in a manner that protects the environment, by spreading the waste in thin layers, compacting it to the smallest practical volume, and covering it with compacted soil by the end of each working day or at more frequent intervals as may be necessary.

Sanitary Landfilling Methods

Area—A method in which the wastes are spread and compacted on the surface of the ground and cover material is spread and compacted over them.

Trench—A method in which the waste is spread and compacted in a trench. The excavated soil is spread and compacted over the waste to form the basic cell structure.

Scavenging—The uncontrolled removal of materials at any point in the solid waste stream.

Seepage—Movement of water or gas through soil without forming definite channels.

Separation—The systematic division of solid waste into designated categories.

Settlement—A gradual subsidence of material.

Differential—The nonuniform subsidence of material from a fixed horizontal reference plane.

Sewage Sludge—A semiliquid solid waste consisting of settled sewage solids combined with varying amounts of water and dissolved materials.

Sewage Treatment Residues—Coarse screenings, grit, or sludge from wastewater treatment units.

Shredder—A machine that reduces the size of solid waste in a continuous operation.

Silt—A fine-grained soil having liquid limits and plasticity indexes that plot below the "A" line on the Unified Soil Classification System plasticity chart.

Slope—The deviation of a surface from the horizontal expressed as a percentage, by a ratio, or in degrees.

Sludge—A semiliquid sediment.

Soil—The unconsolidated natural surface material present above bedrock; it is either residual in origin (formed by the in-place weathering of bedrock) or has been transported by wind, water, or gravity.

Soil Cohesion—The mutual attraction exerted on soil particles by molecular forces and moisture films.

Soil Plasticity—The property of a soil that allows it to be deformed or molded in a moist condition without cracking or falling apart.

Solid Waste—Useless, unwanted, or discarded material with insufficient liquid content to be free-flowing.

Agricultural—The solid waste that results from the rearing and slaughtering of animals and the processing of animal products and orchard and field crops.

Commercial—Solid waste generated by stores, offices, and other activities that do not actually turn out a product.

Industrial—Solid waste that results from industrial processes and manufacturing.

Institutional—Solid wastes originating from educational, health care, and research facilities.

Municipal—Residential and commercial solid waste generated within a community.

Pesticide—The residue resulting from the manufacturing, handling, or use of chemicals for killing plant and animal pests.

Residential—All solid waste that normally originates in a residential environment; sometimes called domestic solid waste.

Solid Waste Management—The purposeful systematic control of the generation, storage, collection, transport, separation, processing, recycling, recovery, and disposal of solid wastes.

Subsidence—Settling or sinking of the land surface due to many factors, such as the

Surface Cracking—Discontinuities that develop in the cover material at a sanitary landfill due to the surface drying or settlement of the solid waste. (These discontinuities may result in the exposure of solid waste, entrance or egress of vectors, intrusion of water, and venting of decomposition gases).

Toe—The bottom of the working face at a sanitary landfill.

Topsoil—The topmost layer of soil; usually refers to soil that contains humus and is capable of supporting good plant growth.

Topographic Map—A map indicating surface elevations and slopes.

Trash—See *Rubbish.*

Vector—A carrier, usually an arthropod, that is capable of transmitting a pathogen from one organism to another.

Volatile Solids—Material of organic nature which converts easily to gases when heated.

Waste—See also *Solid Waste.*

Bulky Waste—Items whose large size precludes or complicates their handling by normal collection, processing, or disposal methods.

Construction and Demolition Waste—Building materials and rubble resulting from construction, remodeling, repair, and demolition operations.

Hazardous Waste—Those wastes that require special handling to avoid illness or injury to persons or damage to property.

Special Waste—Those wastes that require extraordinary management.

Wood Pulp Waste—Wood or paper fiber residue resulting from a manufacturing process.

Yard Waste—Plant clippings, prunings, and other discarded material from yards and gardens. Also known as yard rubbish.

Watershed—Total land area above a given point on a stream or waterway that contributes runoff to that point.

Water Table—The upper limit of the part of the soil or underlying rock material that is wholly saturated with water.

Perched Water—A water table, usually of limited area, maintained above the normal free-water elevation by the presence of an intervening, relatively impervious stratum.

Working Face—That portion of a sanitary landfill where waste is discharged by collection trucks and is compacted prior to placement of cover material.

Zone of Aeration—The area above a water table where the interstices (pores) are not completely filled with water.

Zone of Capillarity—The area above a water table where some or all of the interstices (pores) are filled with water that is held by capillarity (see *Capillary Water*).

decomposition of organic material, consolidation, drainage, and underground failures.

Subsoil—That part of the soil beneath the topsoil usually without an appreciable organic matter content.

APPENDIX E

SOLID WASTE COLLECTION

AND

DISPOSAL COST SUMMARIES

NOTE: The following tables summarize capital and operating costs for solid waste collection, transfer and disposal alternatives in Millard County, Utah. Sources for the tables are references 3, 4, 5, 6 and 9. Amortization of capital costs assumes a capital recovery factor of .16275 (10 years at 10 percent interest). Equipment operation costs include maintenance, overhaul, fuel, and parts. Incremental costs were developed for 1987, and added to 1982 costs to determine 1987 total annual costs.

TABLE E-1
SANITARY LANDFILL COST SUMMARY[1], 1982
REGIONAL SITE

CAPITAL COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base	Total Cost High
Land[2]	-	-	-	-	-
Site Development (includes labor)					
Road Construction (all-weather road)	$ 60,000/mile	0.20		$ 12,000	
Shelter	3,600/unit	1		3,600	
Fencing (stock)	4.10/ft.	1,320		5,400	
Gate	500/unit	1		500	
Diversion Ditches	4/ft.	1,320		5,280	
Wells (monitoring)	500/unit	2		1,000	
Equipment					
Dozer (D-6)	116,000/unit	1		116,000	
Crawler Loader (951)	88,000/unit	1		88,000	
Miscellaneous (utilities, insurance, tools)	-	Lump Sum (L.S.)		5,000	
Engineering, Design (10% of site development cost)	-	L.S.		3,000	
Contingency (5 % of capital costs)				12,000	
		TOTAL		$250,780	Same as base cost.
		AMORTIZED[3]		$ 40,980	
OPERATING COSTS					
Equipment Operation[4]					
Trenching	$1/cy	42,490	49,390	$42,490	$49,390
Spreading and Compacting	.11/cy	39,640	46,380	4,360	5,100
Covering	1 cy	8,500	9,880	8,500	9,880
Maintenance (roads, ditches, grounds)	-	L.S.	L.S.	4,000	4,000
Labor, Operator (full-time)	9/hr.	2,080	2,080	18,720	18,720
Revegetation	1,500/acre	3.0	3.4	4,500	5,100
		TOTAL		$ 82,570	$ 92,190
		TOTAL ANNUAL COST		$123,500	$133,200

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[1] Source: References 3, 4, 5, 6, 9

[2] Land costs should be negligible as site is located on BLM land.

[3] Amortized at 10% interest over 10 years

[4] Includes overhaul, fuel, parts, and maintenance.

TABLE E-2
SANITARY LANDFILL COST SUMMARY, 1987
REGIONAL SITE

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
		TOTAL[1]		$250,780	
		AMORTIZED		40,980	Same as base cost.

OPERATING COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base	Total Cost High
Equipment Operation					
Trenching	$1 cy	28,080	53,570	28,080	53,570
Spreading and Compacting	.11 cy	38,920	69,580	4,280	7,650
Covering	1 cy	5,620	10,710	5,620	10,710
Revegetation	$1,500/acre	1.9	3.8	2,850	5,700
	1987 INCREMENTAL COST			40,830	77,630
	1982 OPERATING COST			82,570	92,190
	1987 TOTAL OPERATING COST			123,400	169,820
	TOTAL ANNUAL COST			$164,400	$210,800

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[1] Equal to 1982 base capital cost.

TABLE E-3
SANITARY LANDFILL COST SUMMARY, 1982
WEST MILLARD SITE

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Site Development (includes labor)					
Road Construction (all-weather road)	$60,000/mi.	0.20		$12,000	
Shelter	3,600/unit	1		3,600	
Fencing	4.10/ft.	1,320		5,400	
Gate	500/unit	1		500	
Diversion Ditches	4/ft.	1,320		5,280	
Wells (monitoring)	500/well	2		1,000	
Equipment					
Crawler Loader (951)	88,000/unit	1		88,000	
Miscellaneous (utilities, insurance, tools)	-	L.S.		5,000	
Engineering, Design (10% of site development cost)				3,000	
Contingency (5% of capital cost)				6,200	
	TOTAL			130,000	
	AMORTIZED			$21,200	Same as base cost.

OPERATING COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Equipment Operation					
Trenching	$1/cy	35,430	40,790	$35,430	$40,790
Spreading and Compacting	.11/cy	36,700	42,340	4,040	4,660
Covering	1 cy	7,085	8,160	7,090	8,160
Maintenance (roads, ditches, grounds)	-	L.S.	L.S.	4,000	4,000
Labor, Operator (full-time)	$9/hr.	2,080	2,080	18,700	18,700
Revegetation	$1,500/acre	2.5	2.8	3,750	4,200
	TOTAL			73,000	80,500
	TOTAL ANNUAL COST			$94,200	$101,700

TABLE E-4
SANITARY LANDFILL COST SUMMARY, 1987
WEST MILLARD SITE

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
		TOTAL		130,000	
		AMORTIZED[1]		$21,200	Same as base cost.
	OPERATING COSTS				
Equipment Operation					
Trenching	$1 cy	25,570	46,650	$25,570	$46,650
Spreading and Compacting	.11 cy	26,530	48,780	2,920	5,370
Covering	1 cy	5,120	9,330	5,120	9,330
Revegetation	$1,500/acre	1.7	3.3	2,550	4,950
	1987 INCREMENTAL COST			36,160	66,300
	1982 OPERATING COST			73,000	80,500
	1987 TOTAL OPERATING COST			109,160	146,800
	TOTAL ANNUAL COST			$130,400	$168,000

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[1] Equal to 1982 base capital cost

TABLE E-5
SANITARY LANDFILL COST SUMMARY, 1982
EAST MILLARD SITE

CAPITAL COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base	Total Cost High
Land[1]	-	-	-	-	-
Site Development (includes Labor)					
Road Construction	$ 60,000/mile	.06		$ 3,800	
Shelter	3,600/unit	1		3,600	
Fencing	4.10/ft.	1,980		8,100	
Gate	500/unit	1		500	
Diversion Ditches	4/ft.	2,640		10,600	
Wells	500/well	2		1,000	
Equipment					
Crawler Loader (951)	88,000/unit	1		88,000	
Miscellaneous (utilities, insurance, tools)	-	L.S.		5,000	
Engineering, Design (10% of site development cost)	-	L.S.		3,000	
Contingency (5% of capital cost)				6,200	
		TOTAL		$129,800	
		AMORTIZED		$ 21,100	

OPERATING COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base	Total Cost High
Equipment Operation					
Excavation	$ 1 cy	19,020	23,150	$19,000	$25,800
Spreading and Compacting	.11 cy	20,870	25,390	2,300	2,800
Covering	1 cy	3,800	4,630	3,800	4,600
Maintenance (roads, ditches grounds)	-	L.S.	L.S.	3,500	3,500
Labor, Operator (half-time)	$9/hr.	1,040		9,400	9,400
Revegetation	$1,500/acre	2	2	3,000	3,000
		TOTAL		41,000	49,100
		TOTAL ANNUAL COST		$ 62,100	$70,200

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[1] Land costs should be negligible, as site is owned by the City of Fillmore.

TABLE E-6
SANITARY LANDFILL COST SUMMARY, 1987
EAST MILLARD SITE

CAPITAL COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base	Total Cost High
		TOTAL		129,800	Same as base cost.
		AMORTIZED		$21,100	

OPERATING COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base	Total Cost High
Equipment Operation					
Excavation	$1/yd ^{3}	6,740	16,875	$ 6,700	$16,900
Spreading and Compacting	.11/yd ^{3}	7,400	19,050	800	2,100
Covering	1 yd ^{3}	1,350	3,370	1,400	3,400
Labor, Operator (full-time)	9/hour	1,040	1,040	9,400	9,400
	1987 INCREMENTAL COST			18,300	31,800
	1982 OPERATING COST			41,000	49,100
	1987 TOTAL OPERATING COST			59,300	80,900
	TOTAL ANNUAL COST			$ 80,400	$102,000

TABLE E-7
BULKY WASTE DISPOSAL SITE COST SUMMARY, 1982

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Site Development (includes labor)					
Fencing	$4.10/ft.	1,320		5,400	
Equipment					
Crawler loader (951)	88,000/unit	1		88,000	
	TOTAL			93,400	
	AMORTIZED			$15,200	Same as base cost.
	OPERATING COSTS				
Equipment Operation					
Spreading and Compacting	$1 cy	9,570	11,650	$ 1,100	$ 1,300
Covering	1 cy	1,910	2,320	1,900	2,300
Labor, Operator	9/hr.	1,040	1,040	9,400	9,400
Revegetation	1,500/acre	1	1	1,500	1,500
	TOTAL			13,900	14,500
	TOTAL ANNUAL COST			$ 29,100	$ 29,700

TABLE E-8
BULKY WASTE DISPOSAL SITE COST SUMMARY, 1987

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
		TOTAL[1]		93,400	Same as base cost.
		AMORTIZED		$15,200	
	OPERATING COSTS				
Equipment Operation					
Spreading and Compacting	$1/cy	3,380	7,950	$ 400	$ 900
Covering	1/cy	680	1,600	700	1,600
Revegetation	1,500/acre	-	.6	-	900
	1987 INCREMENTAL COST			1,100	3,400
	1982 OPERATING COST			13,900	14,500
	1987 TOTAL OPERATING COST			15,000	17,900
	TOTAL ANNUAL COST			$ 30,200	$ 33,100

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[1] Equal to 1982 base capital cost.

TABLE E-9
GREENBOX CONTAINER COST SUMMARY 1982

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Buildings (garage and maintenance facility)	-	L.S.	L.S.	$35,600	$35,600
Equipment					
Compactor truck (30-cubic yard, side-loading)	$70,000/unit	1		70,000	70,000
Containers (3-cubic yard)	300/container	573	675	171,000	202,500
Miscellaneous (tools, equipment, etc.)	-	L.S.	L.S.	5,000	5,000
		TOTAL		281,600	313,100
		AMORTIZED		$45,870	$51,000

OPERATING COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base	Total Cost High
Equipment Operation[1]					
Compactor truck	$18/hour	1,600	1,870	$28,830	$33,700
Labor, Driver/Mechanic	9/hour	2,080	2,290	18,720	21,500
Miscellaneous (utilities, etc.)	-	L.S.	L.S.	600	600
	TOTAL			47,520	54,800
	TOTAL ANNUAL COST			$ 93,400	$105,800

[1] Includes overhaul, fuel, parts and maintenance.

TABLE E-10
GREENBOX CONTAINER COST SUMMARY, 1987

CAPITAL COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base	Total Cost High
Equipment					
Compactor truck (30-cubic yard, side-loading)	$70,000/unit	-	1		$70,000
Containers (3-cubic yard)	300/container	327	695	98,100	208,500
1987 INCREMENTAL COST				98,100	278,500
1987 AMORTIZED INCREMENTAL COST				15,980	45,370
1982 AMORTIZED COST				45,870	51,000
1987 TOTAL CAPITAL COST				$61,850	$96,400

OPERATING COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base	Total Cost High
Equipment Operation					
Compactor truck	$18/hr.	950	1,980	$17,100	$35,640
Driver/Mechanic	9/hr.	1,340	2,540	12,100	22,900
1987 INCREMENTAL COST				29,200	58,540
1982 OPERATING COST				47,520	54,830
1987 TOTAL OPERATING COST				76,720	113,370
TOTAL ANNUAL COST				$138,600	$209,800

TABLE E-11
TRANSFER TRAILER COST SUMMARY, 1982

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Buildings (transfer station, enclosed)	$24,000/unit	1		$24,000	
Equipment					
Transfer trailer (85 cy)	40,000/unit	1		40,000	
Tractor	40,000/unit	1		40,000	
Skid steerloader (.5 cy)	12,000/unit	1		12,000	
Miscellaneous (tools, etc.)	-	L.S.		4,000	
	TOTAL			120,000	
	AMORTIZED			$19,500	Same as base cost.
	OPERATING COSTS				
Equipment Operation					
Tractor	$19.50/hr.	260	312	$ 5,100	$ 6,100
Labor, Driver/Station operator	9/hr.	730	780	6,600	7,000
Miscellaneous (utilities)	-	L.S.	L.S.	1,000	1,000
	TOTAL			12,700	14,300
	TOTAL ANNUAL COST			$ 32,200	$ 33,800

TABLE E-12
TRANSFER TRAILER COST SUMMARY, 1987

CAPITAL COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base	Total Cost High
		TOTAL		120,000	
		AMORTIZED		$19,500	
	OPERATING COSTS				
Equipment Operation					
Tractor	$19.50/hr.	100	255	$ 2,000	$ 5,000
Labor, Driver/Station operator	9/hr.	100	365	900	3,300
Miscellaneous (utilities)	-	L.S.	L.S.	400	1,200
	1987 INCREMENTAL COST			3,300	9,500
	1982 OPERATING COST			12,700	14,300
	1987 TOTAL OPERATING COST			16,000	23,800
	TOTAL ANNUAL COST			$ 35,500	$ 43,300

TABLE E-13
ROLL-OFF CONTAINER (BULKY WASTE) COST SUMMARY, 1982

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	
CAPITAL COSTS					
OPERATING COSTS					
Equipment Operation					
Roll-off truck	$22.25/hr.	940	1,100	$20,800	$24,500
Labor, Operator	9/hr.	1,040	1,200	9,400	10,800
TOTAL				30,200	35,300
TOTAL ANNUAL COST				$57,500	$62,600

TABLE E-14
ROLL-OFF CONTAINER (BULKY WASTE) COST SUMMARY, 1987

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
		TOTAL[1]		167,300	Same as base cost.
		AMORTIZED		$27,200	
OPERATING COSTS					
Equipment Operation					
Roll-off truck	$22.25/hr.	550	1,120	$12,200	$25,000
Labor, Operator	9/hr.	522	1,280	4,700	11,500
	1987 INCREMENTAL COST			16,900	36,500
	1982 OPERATING COST			30,200	35,300
	1987 TOTAL OPERATING COST			47,100	71,800
	TOTAL ANNUAL COST			$ 74,400	$ 99,100

[1] Equal to 1982 base capital costs.

TABLE E-15
ROLL-OFF (SINGLE LANDFILL) COST SUMMARY, 1982

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Equipment					
Compactors (1-cy hopper)	$10,000/unit	10		$100,000	
Roll-off containers (40 cy, closed)	7,100/unit	11		78,100	
Miscellaneous (tools, etc.)	-	L.S.		1,700	
		TOTAL		179,800	
		AMORTIZED		$29,300	Same as base cost.

OPERATING COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Equipment Operation					
Roll-off truck[1]	$22.25/hr.	30	36	$34,200	$41,700
Labor, driver (full-time)	9/hr.	2,080	2,080	18,700	18,700
Miscellaneous (utilities)	-	L.S.		4,800	5,700
	TOTAL			57,700	66.100
	TOTAL ANNUAL COST			$ 87,000	$ 95,400

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[1] Capital cost of truck accounted for in bulky roll-off cost summary.

TABLE E-16
ROLL-OFF (SINGLE LANDFILL) COST SUMMARY, 1987

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Equipment					
Roll-off truck	$50,000/unit	1	1	$ 50,000	
1987 AMORTIZED COST				8,100	
1982 AMORTIZED COST				29,300	
TOTAL AMORTIZED COST				$37,400	Same as base cost.

OPERATING COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Equipment Operation					
Roll-off truck	$22.25/hr.	805	1,710	$17,900	$38,100
Labor, Driver	9/hr.	520	1,820	4,700	16,400
Miscellaneous (utilities)	-	L.S.	L.S.	2,800	5,800
1987 INCREMENTAL COST				25,400	60,300
1982 OPERATING COST				57,700	66,100
1987 TOTAL OPERATING COST				83,100	126,400
TOTAL ANNUAL COST				$120,500	$163,800

TABLE E-17
ROLL-OFF (TWO LANDFILL) COST SUMMARY, 1982

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Equipment					
Compactors (1 cy hopper)	$10,000/unit	9		$ 90,000	
Roll-off containers (40 cy, closed)	7,100/unit	10		71,000	
Miscellaneous (tools, etc.)	-	L.S.	L.S.	2,000	
TOTAL				163,000	
TOTAL AMORTIZED COST				$26,500	Same as base cost.
OPERATING COSTS					
Equipment Operation					
Roll-off truck	$22.25/hr.	1,050 hr.	1,250	$23,300	$27,800
Labor, Driver	9/hr.	1,560 hr.	1,820	14,000	16,400
Miscellaneous (utilities)	-	L.S.	L.S.	4,300	5,100
TOTAL				41,600	49,300
TOTAL ANNUAL COST				$ 68,100	$ 75,800

TABLE E-18
ROLL-OFF (TWO LANDFILL) COST SUMMARY, 1987

CAPITAL COSTS

Item	Unit Cost	Base	High	Base	High
Equipment Roll-off truck	$50,000/unit	1		$50,000	
1987 AMORTIZED COST				8,100	
1982 AMORTIZED COST				26,500	
TOTAL AMORTIZED COST				$34,600	Same as base cost.
OPERATING COSTS					
Equipment Operation Roll-off truck	$22.25/hr.	615	1,245	$13,700	$27,700
Labor, Driver	9/hr.	680	1,300	6,100	11,700
Miscellaneous (utilities)	-	L.S.	L.S.	2,200	5,200
1987 INCREMENTAL COST				22,000	44,600
1982 OPERATING COST				41,600	49,300
1987 TOTAL OPERATING COST				63,600	93,900
TOTAL ANNUAL COST				$ 98,200	$128,500

TABLE E-19
ROLL-OFF TRANSFER COST SUMMARY, 1982

CAPITAL COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Building (two-story)	-	L.S.		$24,000	
Equipment					
Roll-off containers	$ 9,000/unit	2		18,000	
Roll-off truck[1]	-	-		-	
Skid steer loader (.5-cy bucket)	12,000/unit	1		12,000	
Stationary compactor (5-cy with hopper)	25,000/unit	1		25,000	
Miscellaneous (tools, equipment)	-	L.S.		4,000	
	TOTAL			83,000	
	TOTAL AMORTIZED COST			$13,500	Same as base cost.

OPERATING COSTS

Item	Unit Cost	Units		Total Cost	
		Base	High	Base	High
Equipment Operation					
Roll-off truck	$22.25/hr.	680	780	$15,000	$17,400
Labor, Driver/Station Operator	9/hr.	1,560	1,820	14,000	16,400
Miscellaneous (utilities)	-	L.S.	L.S.	1,400	1,400
	TOTAL			30,400	35,200
	TOTAL ANNUAL COST			$ 43,900	$ 48,700

---

[1] Truck from bulky waste system used.

TABLE E-20
ROLL-OFF TRANSFER COST SUMMARY, 1987

CAPITAL COSTS

Item	Unit Cost	Units Base	Units High	Total Cost Base[1]	Total Cost High[2]
TOTAL				$83,000	$133,000
TOTAL AMORTIZED COST				$13,500	$21,600
OPERATING COSTS					
Equipment Operation Roll-off truck	$22.25/hr.	210	670	$ 4,700	$15,000
Labor, Driver/Station Operator	9/hr.	630	1,300	4,700	11,700
Miscellaneous (utilities)	-	L.S.	L.S.	500	1,400
1987 INCREMENTAL COST				9,900	28,100
1982 OPERATING COST				30,400	35,200
1987 TOTAL OPERATING COST				40,400	63,300
TOTAL ANNUAL COST				$ 53,900	$ 84,900

[1] Equal to 1982 capital costs.
[2] Includes cost of new roll-off truck.

APPENDIX F

SAMPLE CALCULATIONS

WASTE VOLUME CALCULATIONS

ANNUAL WASTE GENERATION

1982

Compactable Waste
Entire County

Area	Rate (lbs/person/day)	Population	Waste Quantity (lbs/day)
Delta and Fillmore	4.3	5,485	23,585
Remainder of County	2.3	5,335	12,270
Total		10,820	35,855 lbs/day

Total Annual Volume = $(35{,}855\ \frac{\text{lbs}}{\text{day}}) \times (365\ \frac{\text{days}}{\text{year}}) \div (175\ \frac{\text{lbs}}{\text{cy}}) = \frac{74{,}780}{\text{year}}$ cy

Compacted Volume (at 1,000 lbs/cy in place, in the landfill) =
$(74{,}780\ \text{cy/year}) \times \frac{(175\ \text{lb/cy})}{(1{,}000\ \text{lb/cy}}= 13{,}090$ cy/year

Volume of Waste and Cover (with a 1:4 cover to waste ratio) =
(13,090 cy/year) x (1.25) = 16,360 cy/year

Non-Compactable Waste
West Millard County

Area	Rate (lbs/person/day)	(Population)	Waste Quantity (lbs/day)
West Millard	2.0	6,495	12,990

Total Annual Volume =

$\frac{(12{,}990\ \text{lb})}{\text{day}} \times \frac{(365\ \text{days})}{\text{year}} \div \frac{(750\ \text{lbs})}{\text{cy}} = 6{,}320\ \frac{\text{cy}}{\text{year}}$

Volume of Waste and Cover (with a 1:4 cover to waste ratio) =
(6,320 cy/year) x (1.25) = 7,900 cy/year

East Millard County

Area	Rate (lbs/person/day)	Population	Waste Quantity (lbs/day)
East Millard	2.0	4,325	8,650

Total Annual Volume = (8,650 lbs/day) x (365 days) ÷ (750 lbs/cy)=4,210cy/year

Volume of Waste and Cover (with a 1:4 cover to waste ratio) =
(4,210 cy/year) X (1.25) = 5,260 cy/year

LANDFILL CALCULATIONS

Regional Landfill

Annual Trench Length Required

The trench dimensions are:

a 22-foot base,
15 foot depth, and
1:1 sidewalls

The corresponding volume per linear foot of trench is 555 cubic feet, or 20.6 cy/foot of trench.

$$\text{Compactable Waste Trench Length} = \left(\frac{16{,}360\ \text{cy}}{\text{year}}\right) \div \left(\frac{20.6\ \text{cy}}{\text{foot}}\right) = \frac{794\ \text{ft}}{\text{year}}$$

$$\text{Bulky Waste Trench Length} = \left(7{,}900\ \frac{\text{cy}}{\text{yr}}\right) \div \left(\frac{20.6\ \text{cy}}{\text{foot}}\right) = \frac{383/\text{ft}}{\text{year}}$$

Annual Area Required

$$\left(\frac{20.6\ \text{cy}}{\text{feet}}\right) \div 62\text{ft (width of trench + 10')} = \left(\frac{.33\ \text{cy}}{\text{ft}^2}\right) \times \left(\frac{43{,}560\ \text{ft}^2}{\text{acre}}\right) = 14{,}375\ \frac{\text{cy}}{\text{acre}}$$

Total acres affected

$$= \frac{16{,}360\ \text{cy} + 7{,}900\ \text{cy}}{14{,}375\ \text{cy/acre}} = 1.7\ \text{acres}$$

Bulky Waste Site

Annual Trench Length Required

$$\text{Trench Volume} = \frac{20.6\ \text{cy}}{\text{foot of trench}}$$

Bulky Waste Trench Length =

$$\left(\frac{5{,}260\ \text{cy}}{\text{year}}\right) \div \frac{20.6\ \text{cy}}{\text{foot}} = \frac{255\ \text{ft}}{\text{yr}}$$

Annual Area Required

$$\left(\frac{20.6\ \text{cy}}{\text{ft}}\right) \div 62\ \text{ft} = \left(\frac{.33\ \text{cy}}{\text{ft}^2}\right) \times \frac{(43{,}560\ \text{ft}^2)}{\text{acre}} = 14{,}375\ \frac{\text{cy}}{\text{acre}}$$

Total acres affected

$$= \frac{5{,}260\ \text{cy}}{14{,}375\ \text{cy/acre}} = .4\ \text{acres}$$

GREENBOX CALCULATIONS

Residential Compactable Waste

Each resident of Millard County produces
.092 cy of residential compactable waste per week
(2.3 lb/person/day) x (1 person) x (7 days/week) ÷ (175 lb/cy)
= .092 cy/week

Each greenbox has a capacity of 3 cubic yards, so that each greenbox could service 32.6 persons

$$\frac{\text{(3 cy)}}{\text{greenbox}} \div (.092\ \text{yd}^3\text{/person/wk}) = \frac{\text{32.6 persons}}{\text{greenbox}}$$

Rounding this to 30 persons/greenbox it was assumed that greenboxes would be 50% full when serviced in Delta and Fillmore, and 70% full in all other areas of the County.

For Delta, 106 greenboxes are required for biweekly service.

(3,185 persons) ÷ [(30 persons/greenbox/service/week) x (50% full)] x
(2 services/week) = 106 greenboxes

For Hinckley, 34 residential greenboxes are required.

(710 persons) ÷ [30 persons/greenbox/service/week) x (70% full)]
x (1 service/week)= 34 greenboxes

Commercial Compactable Waste

Each resident of West Millard County generates 2.0 lb/person/day of commercial compactable waste. The resulting waste volume per week is:

(2.0 lb/person/day) x (6,495 persons) x (7 days/week) ÷ (175 lb/cy)
= 520 cy/week

The number of greenboxes required for service three times per week is:

$$\text{(520 cy/week)} \div 3\ \text{(cy/greenbox)} \div \frac{\text{(3 services)}}{\text{week}} = 58\ \text{greenboxes}$$

APPENDIX G

SOLID WASTE FACILITY FINANCING OPTIONS

APPENDIX G

SOLID WASTE FACILITY FINANCING OPTIONS

Solid waste collection and disposal includes such capital costs as land, equipment, and site improvements. Operating costs include salaries, utilities, fuel, site and equipment maintenance, and administrative costs. Several methods of funding solid waste systems are available, and the following discussion considers the advantages and disadvantages of current revenue ("pay-as-you-go") financing, long-term borrowing, leasing, and government grant and loan utilization, especially for small communities.

CURRENT REVENUE FINANCING

Current revenue financing employs a sales tax, property tax, special assessment tax, or a combination of the above, and is based on the "pay-as-you-go" philosophy. The advantage of using current revenues is its simplicity -- few informational, analytical, institutional, or legal arrangements are required. The general tax fund often cannot provide enough money to meet capital costs, but it is frequently used to help meet operating costs. An advantage in using the general fund for supplying operating expenses is that administrative procedures and the extra cost of billing and collecting are eliminated.

Solid waste management is commonly regarded as a low priority when general funds are apportioned, resulting in an insufficient budget and inadequate administration. Due to the lack of large amounts of available money in the general fund, another source of financing, such as long-term borrowing, is often necessary for financing capital costs. A disadvantage in using current revenues for capital expenditures is that tax revenues lag behind needed public services. For areas experiencing rapid growth, this places an inequitable burden on the present population.

Charges levied on the users of the collection and disposal system are another source of funds for the "pay-as-you-go" method of financing. User fees are a means of obtaining operating revenue, but they may also be used to generate funds for future capital expenditures. Fees must be periodically updated, to provide a fair and viable source of income.

For small communities experiencing rapid increases in population, the "pay-as-you-go" method forces present citizens to pay for future demands. A straight user fee would place too large a burden on the present population. If waste generation surges, Zauser[1] suggests using general fund contributions or another form of financing to pay for initial costs. Future user charges can then be used to cover annual operating expenses and debt amortization.

LONG-TERM BORROWING

Long-term borrowing is a common method of financing the capital costs of solid waste systems. Typical instruments are the revenue bond and the general obligation bond.

Revenue bonds are tax-exempt obligations that pledge user fees to guarantee repayment of the debt's principal and interest. In this case, fees must be charged to landfill users in amounts necessary to cover all capital and operating expenses. Revenue bonds and associated user fees are attractive because the producer of solid waste pays the true costs of its disposal. Also, voter approval is not necessary.

A possible disadvantage to consider is that a feasibility study of the project to be financed is required, which may be expensive. Revenue bonds are generally used to finance a single project, and the effective minimum size offering is normally greater than that of a general obligation bond. For a small, single community, revenue bond financing is often uneconomical.

General obligation bonds are the most commonly used instrument for financing capital outlays. They are tax-exempt obligations secured by the full faith and credit of a political jurisdiction which has the ability to levy taxes.

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[1] See Source 1.

Because the real estate taxes of the jurisdiction are usually pledged, the bond is less risky and more marketable than a revenue bond. General obligation bonds also do not require a detailed feasibility study of the proposed project, and offer the lowest interest rates of any financial instrument.

LEASING

Another option to consider is leasing. The local government rents the use of an asset (land, mobile equipment, etc.) which has been purchased by a third party. The government in turn can lease it to a private operator. The Economic Recovery Act of 1981 provides special provisions for lease-back arrangements where a public body can purchase an asset, sell it to a private party, and then lease the equipment back. Such arrangements should be explored carefully.

An advantage to leasing is the postponement and spreading out of cash payments, therefore lessening the demand on initial capital outlays. In this regard, leasing may be a useful option for financing systems to be used by areas experiencing high population growth. Less legal work is usually involved than for other types of financing, and generally voter approval is not required.

Traditional leasing is generally more expensive than long-term, tax-exempt bonds. At the expiration of the lease, the local government will not own or control the machinery or land leased, unless the contract specifies leasing with an option to buy. If municipal credit is poor or bonds can't be issued, leasing may be the most viable option. Leasing is available to both public and private entities, but is to date more commonly used by private enterprise. However, use of leasing is increasing due mostly to high interest rates and resultant advantageous cash flows. In addition, several forms specialize in providing lease arrangements for solid waste equipment and can custom tailor leases for almost any situation.

Leasing arrangements can be devised to transfer tax credits, defer or schedule payments, provide conversion or trade-up plans, cover several item purchases under an umbrella arrangement, or simply to act as an installment sales contract with no down payment.

GRANTS AND LOANS

Financial assistance through federal, state and regional entities is a method of supplementing other types of financing. The Farmer's Home Administration (FmHA) is authorized to provide financial assistance to public entities, in the form of grants and loans, for waste disposal facilities in rural areas and towns with a population less than 10,000. To be eligible, the applicant must be unable to obtain credit or financing from other sources. Priority is placed on areas with a population of less than 5,000.

According to FmHA authorities, however, grants and loans have not been provided for solid waste disposal. Funds are not expected to become available in the near future. Additional information may be obtained by contacting the county or district office of FmHA.

The Environmental Protection Agency is another potential source of funding. The Resource Conservation and Recovery Act authorizes funding through the Solid and Hazardous Waste branch, for technical assistance in state level planning studies for solid waste management. The act also authorizes funding of regional and local government projects. However, funds for solid waste assistance are not currently available, and no immediate change is expected in that status.

SPECIAL SERVICE DISTRICTS

The State of Utah allows the formation and operation of special service districts (including solid waste) by counties, cities and towns. Article XLV, Section 8 of the Constitution of Utah discusses in detail the powers of these districts, such as the services to be performed, levying of taxes, issuance of bonds payable from taxes after an election, the limitations on bonds payable from taxes, the issuance of revenue and guaranteed bonds, and the levying and collection of fees and charges.

In establishing such a district, the initial resolution must describe the bounds and services of the district. A petition and public hearing are necessary. If the resolution is adopted, the district becomes a quasi-municipal public corporation distinct from the County or municipality. The government authority of the County which established the district has supervisory authority and may delegate power to an appointed or elected administrative control board.

In regards to district funds, County laws apply. Funds are administered in the same manner as other County funds, but are segregated. The district may borrow money and issue bonds and notes. Bonds may be payable from property taxes, revenue bonds, general obligation bonds, or a combination. The limitation for bonds payable from property taxes states that borrowing cannot exceed 12 percent of 100 percent of the reasonable fair cash value of the taxable property in the service district. General obligation bonds may be issued in excess of the 12 percent limit, but only under certain conditions. Tax levies and bonds must be authorized by a majority of the voters in the special service district.

The previously discussed methods of financing are intended to provide a broad overview of techniques available. This description is not comprehensive, as other less common methods, and creative combinations of the described methods, may result in viable financing alternatives. It is recommended that professional financial consultants be utilized to model a financial plan, when the solid waste system is ready to be implemented.

SOURCES

1. Financial Solid Waste Management in Small Communities by Eric Zausner, Report (SW-57ts), USEPA, Office of Solid Waste Management Programs, 1972.

2. Federal Financial Assistance for Pollution Prevention and Control, prepared by the USEPA and the Council on Environmental Quality.

3. Resource-Recovery Plant Implementation: Guide for Municipal Officials Financing, compiled by Robert Randall, Guide No. 471, USEPA, 1975.

4. Sanitary Landfill Design and Operation by D.R. Brunner and D.J. Keller, Report (SW-65ts), USEPA, 1971.

APPENDIX H

SOLID WASTE ORDINANCE

SUGGESTED SOLID WASTE MANAGEMENT ORDINANCE FOR LOCAL GOVERNMENT

This document (SW-73d) was completed under grant S802768-01-1
for the Office of Solid Waste Management Programs
by the NATIONAL ASSOCIATION OF COUNTIES RESEARCH FOUNDATION

U. S. ENVIRONMENTAL PROTECTION AGENCY
1974

Foreword

This suggested ordinance for local government usage was compiled from many sources and consists of the best sections, in the opinion of the writer, of over 100 ordinances reviewed. It should be enacted only after careful consideration of local conditions and existing state and local constitutional and statuatory requirements.

This ordinance is applicable to any local political subdivisions and could be used, with modifications, in a multijurisdictional area.

The ordinance has been prepared for guidance under the authorities of Sec 209 (b) (1) of the Solid Waste Disposal Act, as amended. Many sections will not be applicable to particular situations. These, of course, should be deleted. Applicable sections should be revised, renumbered and/or otherwise modified to conform to local practices.

The assembly of this document was initiated under contract PH-86-27-290, between the National Association of Counties Research Foundation and The Public Health Service of Department of Health, Education and Welfare, and completed under grant S802768-01-1, between National Association of Counties Research Foundation and the Office of Solid Waste Management Programs of the U. S. Environmental Protection Agency.

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Suggested Solid Waste Management Ordinance for Local Government

An Ordinance authorizing and directing the planning, establishment, maintenance and operation of a comprehensive solid waste management system; the establishment and enforcement of necessary and proper regulations for the management of solid waste; the establishment and collection of residential solid waste management service charges; and for other purposes.

COMMENT: *The preamble is a means of indicating legislative intent, or the problems which led to the enactment of the law. It is not a part of the law itself.*

1. Short Title

This ordinance shall be known any may be cited as the Solid Waste Management Ordinance of (________________).

COMMENT: *This ordinance would be applicable to any political subdivision of the State and could be used, with modification, in a multi-jurisdictional agency where appropriate legislative authority has been given.*

2. Declaration of Policy

It is hereby declared to be the purpose of this ordinance to regulate the storage, collection, transport, processing, recovery, and disposal of solid waste in order to protect the public safety, health, and welfare and to enhance the environment of the people of (________________).

COMMENT: *This is the official expression of the intent of the legislative body enacting the ordinance. A court interpreting the ordinance, in whole or in part, would be obligated to arrive at the intent of the legislature, in this case, the protection of public safety, health, and welfare, and environment.*

3. Definitions

For the purposes of this ordinance, the following words and phrases shall have the meaning given herein unless their use in the text of the ordinance clearly demonstrates a different meaning.

Abandoned Vehicle – A vehicle that applicable State laws deem to have been abandoned.

Administrative Department – The Department of this municipality charged with the administrative management of this ordinance.

Agricultural Solid Waste – The solid waste that results from the rearing and slaughtering of animals and the processing of animal products and orchard and field crops.

Bulky Waste – Items whose large size precludes or complicates their handling by normal collection, processing, or disposal methods.

Collection – The act of removing solid waste from the central storage point at the source of generation.

Commercial Solid Waste – Solid waste generated by stores, offices, and other activities that do not actually turn out a product.

Commissioner – The duly qualified and appointed person in charge of the Agency which is responsible for the enforcement of those aspects of this ordinance related to the protection of the public safety, health, welfare, and environment.

Dead Animals – Animals that have died from any cause except those slaughtered for human consumption.

Director – The duly qualified and appointed person in charge of the department which is responsible for the administrative management of this ordinance.

Disposal – The orderly process of discarding useless or unwanted material.

Dump – A land site where solid waste is disposed of in a manner that does not protect the environment.

Enforcement Agency – The Agency of this municipality charged with the enforcement of those aspects of this ordinance related to the protection of the public safety, health, welfare and environment.

Generation – The act or process of producing solid waste.

Hazardous Waste – Those wastes such as toxic, radioactive or pathogenic substances which require special handling to avoid illness or injury to persons or damage to property.

Incineration – The controlled process by which solid, liquid, or gaseous combustible waste are burned and changed into gases, and the residue produced contains little or no combustible material.

Industrial Solid Waste – Solid waste that results from industrial processes and manufacturing.

Institutional Solid Waste – Solid waste originating from educational, health care, and research facilities.

Local Government – A public corporation, created by Government for political purposes, and having subordinate and local powers of legislation: e.g., a county, town, city, etc., or combination thereof.

Natural Resources – Materials which have useful physical or chemical properties which exist, unused, in nature.

Non-Residential Solid Waste – Solid waste from agricultural, commercial, industrial, or institutional activities or a building or group of buildings consisting of five or more dwelling units.

Incinerator – An engineered apparatus used to burn waste substances and in which all the factors of combustion – temperature, retention time, turbulence, and combustion air – can be controlled.

Person – Any individual, partnership, co-partnership, firm, company, public or private corporation, association, joint stock company, trust, estate or any other legal representative, agent or assigns.

Pollution – The condition caused by the presence in the environment of substances of such character and in such quantities that the quality of the environment is impaired or rendered offensive to life.

Processing – Any method, system, or other treatment designed to change the physical form or chemical content of solid waste.

Recovered Resources – Materials which still have useful physical or chemical properties after serving a specific purpose and can, therefore, be reused or recycled for the same or other purposes.

Recovery – The process of obtaining material or energy resources from solid waste. Synonyms: extraction, reclamation, salvage.

Energy Recovery – The obtaining of energy available from the heat generated when solid waste is incinerated.

Recycling – The process by which recovered resources are transformed into new products in such a manner that the original products lose their identity.

Rendering – A process of recovering fatty substances from animal parts by heat treatment, extraction, and distillation.

Residential Solid Waste – All solid waste that normally originates in a residential environment. This definition is applicable to the solid waste from a building of four or less separate units.

Reprocessing – The action of changing the condition of a secondary material.

Reuse – the reintroduction of a commodity into an economic stream without any change in its physical characteristics.

Salvage – The utilization of waste materials.

Salvaging – The controlled removal of waste materials for utilization.

Sanitary Landfill – A site where solid waste is disposed using sanitary landfilling techniques.

Sanitary Landfilling – An engineered method of disposing of solid waste on land in a manner that protects the environment by spreading the waste in thin layers, compacting it to the smallest practical volume, and covering it with soil by the end of each working day.

Scavenging – The uncontrolled removal of materials at any point in solid waste management.

Scrap – Discarded or rejected material or parts of material that result from manufacturing operations and are suitable for reprocessing or recycling.

Home Scrap – Scrap that never leaves the manufacturing operation and is routinely reprocessed. (Also referred to as revert scrap, millbroke, or turn-around scrap).

(Prompt) Industrial Scrap – Scrap that is generated during the manufacture of a product.

Secondary Material – A material that is utilized in place of a primary or raw material in manufacturing a product.

Separation – The systematic division of solid waste into designated components.

Solid Waste – Useless, unwanted, or discarded material with insufficient liquid content to be free flowing.

Solid Waste Management – The purposeful, systematic control of the generation, storage, collection, transport, separation, processing, recovery and disposal of solid waste.

Storage – The interim containment of solid waste, in an approved manner, after generation and prior to ultimate disposal.

Transport – The movement of solid waste subsequent to collection.

Transfer Station – A site at which solid waste is concentrated after collection and before processing or disposal.

COMMENT: *Definitions are important to clarify the meaning of terms which are not self-explanatory. A definition section is an integral part of a solid waste management ordinance. This section is important to the* *administration and interpretation of the ordinance. Unduly restrictive or vague definitions should be avoided. Another purpose of a section of definitions is to assist anyone interpreting the ordinance or section, in arriving at legislative intent. In the absence of definitions, the ordinary meaning of the language under scrutiny would be used. State legislation will control collection, storage and disposal of abandoned vehicles including their definition, and must be the source of local authority for action. Some States have recently enacted enabling legislation for municipal action in this field.*

4. Administrative Department

The Department of (________________) shall be responsible for the administrative management of this ordinance and the rules and regulations authorized in Section 6.03.

COMMENT: *Solid Waste Management is normally the responsibility of the Department of Public Works, or a similar agency, which may be headed by an executive called the Director. Depending upon the local government organization or the services to be rendered, the responsibility for solid waste management may be assigned to an organizational unit within the Department of Public Works, or may be a separate function of local government.*

There are advantages and disadvantages to having a separate organizational unit. The advantages include a separate budget, more visibility to the public and elected officials, total attention devoted to the problem, no sharing of equipment and personnel, direct responsibility to the elected officials, and a higher priority status. The disadvantages include further fragmentation of local government, lack of coordination with related programs and duplication of certain types of personnel (e.g. budget, research, accounting).

5. Enforcement Agency

The (________________) Agency shall be responsible for the enforcement of those aspects related to the protection of the public safety, health, welfare, and environment of this ordinance and the rules and regulations authorized in Section 8.01.

COMMENT: *This is a responsibility that may be assigned to the agency in charge of health related activity, usually the Department or Board of Health, under the direction of a Commissioner. The trend at the State level and in large population areas is to create a separate agency charged with the responsibility of environmental protection. The development and enforcement of rules and regulations pertaining to safety, health, welfare and the environment would be a function of that agency.*

Administrative management and enforcement responsibility may be combined in one agency where permitted by law.

6. Powers and Duties of the Administrative Department

6.01 Solid Waste Management Plan. The Director, in co-operation with the Commissioner or the Enforcement Agency, and with the advice of the Solid Waste Advisory Board, shall survey the solid waste management practices within the locality and prepare a Solid Waste Management Plan to be compatible with the State plan, showing therein all present management activities and recommended management activities for future use, taking into consideration population growth, solid waste generation, land development regulations and overall system management including organizational, financing, and regulatory capabilities. The plan shall consider the qualitative and quantitative increases in the solid waste expected to be generated within the area governed from residential, commercial, industrial, and agricultural sources, and shall be submitted to the State for review and approval. The plan developed should not only consider area wide approaches, but must be designed to be operational and when implemented must be an environmentally acceptable and economically efficient solid waste management system.

COMMENT: *The primary sources of authority for local government activity are the State Constitution and enabling legislation, which sets out the areas where local activity can take place. A further restraint is in State laws setting standards which must be met by all inferior units of government. Before any legislative action is* *taken, these areas must be studied carefully to assure that it is authorized. Otherwise, the legislation enacted will be null and void, which will cause problems, including legal action against the local government.*

The use of the word "shall" in legislation usually imposes a mandatory duty upon the official involved. Here, the Director of the Administrative Department has the duty to prepare a plan for solid waste management. In cases where a discretionary duty is given by legislation "may" is used. No time limit is set here for implementation because each governing body will have unique problems which must be solved and it will be the best judge of any time restraints, subject to those set forth by the State on the preparation and implementation of the Solid Waste Management Plan, which must not conflict with that of any higher authority.

Although the Director is responsible for the Solid Waste Management Plan, its development and implementation must be co-ordinated with all governmental units with a responsibility or interest in solid waste management. The plan for solid waste management must serve five functions: (1) provide a technical and policy guideline for effective solid waste management; (2) provide a public-directed framework of standards for solid waste management planning and implementation; (3) provide for an integrated management system covering all elements from generation through disposal either through direct operations or regulated performance; (4) establish methods and procedures for translating the plan into system design and direct operations; (5) serve as a legislative support document for furthering the improved management of solid waste within the jurisdiction.

6.02 Solid Waste Management System. The Director shall provide for a solid waste management system consistent with the Solid Waste Management Plan, consisting of storage, collection, transport, processing, separation, recovery, and disposal through public ownership, or through exclusive agreements with one or more persons for a part or all of such solid waste system, or he may, through the permits in Sections 6.04 and 7.01 authorize any person to manage the solid waste which he generates pursuant to the terms of this ordinance.

COMMENT: *In arriving at the decision to use public or private resources, or any combination of the two, local government must consider such factors as capital investment, personnel resources, service to be rendered, operating and maintenance costs, and the revenue required to support the solid waste management system.*

In any event, control must always be retained by local government which can be accomplished by the use of permits, the establishment of fees, rules and regulations and the use of inspection powers.

For example, the local government could process or dispose of solid waste while the collection could be provided by private enterprise.

This suggested ordinance is designed to permit the local government to select either a public or private solid waste management system or combination thereof and still operate within its provisions.

6.03 Rules and Regulations. The Director may adopt, revise, revoke and enforce rules and regulations governing the administration of this ordinance.

COMMENT: *The authority given here is limited to those rules and regulations applicable to administration and does not include the rules and regulations governing safety, health, welfare and environment which are the responsibility of the Enforcement Agency. These rules and regulations must be compatible with state law and applicable rules and regulations of the state.*

6.04 Permits. The Director is hereby authorized to issue permits for all elements of solid waste management including alteration of existing facilities or systems. All such permits shall be non-transferable, shall be for a term of one year and shall be subject to the fees set forth in Section 20. All permits so issued shall be conditioned upon observance of the laws of this State, the ordinances of this governing body and the rules and regulations authorized herein.

COMMENT: *Permits are needed even in a publicly operated solid waste management system. By their use, regulation is achieved from identification of waste at the point of generation through disposal. This ordinance provides that all persons, other than those storing their own residential solid waste must possess a valid permit for each step through disposal, with issuing authority being vested in the Director of the Administrative Department.*

Permits have a long history of use in the regulation of business or professions. When used in a solid waste management system they identify all persons involved in solid waste management, the type of waste being managed and to control its movement through disposal by approved methods.

The permits authorized in an ordinance are supplemental to permits required by either State or local law. A *permit to operate an incinerator would not excuse the holder from receiving clearance from the State Air Quality Act, as well as the Water Quality Act where quench waters are involved. Local building permits and building codes would be prerequisites to the issuance of the permits authorized here.*

The permits are expressly conditioned upon observance of all applicable laws and the rules and regulations authorized herein. Therefore, failure to observe either would be a valid ground for suspension or revocation. Such action may be a drastic step, and should be used only when alternative solid waste management systems or methods are available. For example, if there is only one sanitary landfill, revocation of that permit might create more problems than it solves.

The Director of the Administrative Department is authorized to prepare application forms which must include all information required by Section 7 with an omnibus clause to use for any special information required by the local government.

Since fraud vitiates a legal document, a false statement (see Section 25.07) in the application would be grounds for revocation. In such case, good judgement would dictate weighing the falsity and, if of a minor nature, taking no action.

Since the permit is not transferable, the purchaser of an activity controlled by a permit would be required to apply for and receive the authorization prior to continuing the regulated activity.

There are fields of activity in solid waste management where the number of permits should be limited in order to insure efficient and economical operation. In those areas, the Director would have the right to refuse to entertain new applications. An illustration of this is in collection, where the area served will generate sufficient revenues to attract a limited number of qualified applicants. In other words, if a large number of permit holders are in a limited area, there will be a duplication of routes resulting in short cuts in service, which are not compatible with proper solid waste management.

The governing body should establish the time period the permit should be in force. Many localities are on a one-year time frame corresponding to the budget period while others have various periods up to five years. In a smaller locality where little paperwork is involved in renewing permits, one year might be a good time period. For a large locality with many permits in force the work load may be too great for annual renewal; therefore a longer interval might be preferred. A permit term of one year is set forth here and would give an added control tool to the Director, who could refuse to renew the permit where a long history of minor substandard performance is involved.

Application and permit fees are the rule rather than the exception. An application fee would have to accompany each application and would aid in meeting administrative costs; therefore it should not be returned. It will also determine the sincerity of the applicant. Application for the renewal of an existing permit need not require a fee.

Initial or renewal permit fees should be realistic. A fee which exceeds the cost of issuance and supervision should be avoided, as well as one of a nominal amount. The desirable figure would be one which would make the permit system self-supporting.

The Director should evaluate the information given in each application. In doing this they can inspect physical facilities to assure compliance with the applicable standards and, at the same time, weigh intangibles, such as personnel qualifications, operational plan, financial responsibility, etc.

Once the inspection is completed the Director has open three courses of action. He can issue the permit; he can deny the permit, in writing, stating the reasons therein or; he can inform the applicant of the changes needed to allow the permit to issue.

Any substantial alteration, modification or enlargement must be by permit, a matter which can be covered by the omnibus clause in each section setting forth application form contents. The same clause can be used for other needs peculiar to the user municipality, such as performance bonds.

In any denial of application, the action of the Director must not be arbitrary.

The rules and regulations for the administration of the ordinance should set out administrative procedures for the processing of applications, including the time period between receipt of the application and the action authorized in Section 7. The Director should have an interval which will allow a careful review, keeping in mind that there will be other applications and duties which must receive attention. To allow inaction to replace a positive approval or disapproval within a time frame should be avoided. When an application is rejected, the applicant has the right to utilize the appeals procedures set forth in Section 21.

6.05 Bulky Waste Collection. The Director shall establish the necessary procedures to collect and dispose of bulky waste from residential units within this locality.

COMMENT: *Bulky Waste is defined in Section 3 and would include any solid waste which could not be picked up during routine collection. If a packer truck is used, the size of the opening would be the limit on bulky waste. The usual bulky waste would include "white goods," that is stoves, refrigerators or washers, or such items as furniture or hot water tanks. Interior storage prior to pick-up is needed to avoid unsightly accumulations at residences. The size of the locality will determine schedule. A small locality could make one collection per month, with larger localities needing a more sophisticated approach. The owner of such waste items in a small locality would not be prohibited from taking bulky items to an approved processing or disposal facility. Under the powers in Section 6.02 this could be either a public operation or it could be done by contract.*

6.06 Dead Animals. The Director shall provide the necessary equipment and personnel to remove dead animals within this locality and shall schedule such collections to provide pick-up with a minimum delay. This Section shall not apply to dead animals, or parts thereof, from any commercial or agricultural activity within this locality.

COMMENT: *This Section is designed to provide the sanitary collection and disposal of dead animals within the locality and to prevent the use of normal solid waste collection service for dead animal disposition. Such service would include animals killed in traffic. Disposal would be through existing facilities, such as an incinerator or a sanitary landfill.*

6.07 Contracts. All contracts entered into by the Director under this ordinance shall meet the following minimum requirements:

a. Be with the consent of the Legislative Body of this locality.
b. Prior approval of the chief legal officer of this locality.
c. Be for a term of not less than ________years, nor more than ________years.
d. Meet the insurance requirements of this ordinance.
e. Be awarded to the lowest and best bidder.
f. Show full details of ownership of the successful bidder, including the names and addresses of all principals, or officers and majority stockholders, if a corporation.
g. Such other conditions as may be set forth in instructions to bidders or other necessary qualifications, as required by the contemplated work.

COMMENT: *All contracts entered into by the Director of the Administrative Department shall be with the consent of the local governing body. It should be approved by the chief legal officer, who will have been active in its drafting. A contract for a one-year period will be too short to attract bidders where large financial commitments for facilities and equipment are involved. Present economic conditions do not encourage a long term contract unless it contains provisions for adjustment to meet increased costs brought about by inflation. In drafting such clauses it should be kept in mind that changes in techniques may result in lower costs; therefore, a change in the contract prices should include this factor, which can also be invoked in a deflationary period.*

Insurance bonds are required by Section 18 and are limited to performance and payment bonds and liability insurance. The payment bond would include premium liability and equipment liability. In those States where private insurance companies handle workmen's compensation, that requirement would be included in the ordinance.

Price alone is not a good criterion for the award of a contract since high standards may be expensive. Another factor to be considered is that the lowest bidder may be forced to reduce services in order to make a profit.

6.08 Solid Waste Management Districts. The Director is hereby authorized to create one or more solid waste management districts within the boundaries of this locality in order to provide efficient and economical solid waste management.

COMMENT: *This section and the following sections will enable the Director to obtain efficient and economical solid waste management by the creation of districts and the regulation of private contractors to serve each district so created.*

Regulation, through permits, of the optimum number of private persons will eliminate inefficiency, such as duplication of routes.

6.09 *Private Contractor Regulation*. The Director shall determine the number of contractors needed to efficiently serve the locality or all districts created under Section 6.08 and shall issue permits to the contractor or contractors who are found to be qualified until the needs of the locality are met. Nothing in this ordinance shall prevent one contractor from serving the locality or all districts created under Section 6.08.

COMMENT: *This will give the Director the needed authority to exercise control over private contractors who are managing solid waste within the locality. The goal to be achieved is efficient and economical service to all generators of solid waste and it may be achieved through the use of one or more contractors. This section would also allow the use of one or more contractors for collection and one or more contractors for disposal, or both collection and disposal could be combined under one contract. If the system used involves other activity, such as processing or resource recovery, that could be included in each district authorized by this section.*

6.10 *Service Charges, Non-Residential Solid Waste*. The Director shall not set or regulate any service charges for non-residential waste management by private contractors.

COMMENT: *This section is directed to contractors serving non-residential solid waste sources, who are left free to negotiate for the fees charged their customers. This section would not be used in any area where a local government monopolizes solid waste management. This suggested ordinance is designed for use in a locality where non-residential solid waste may be managed by private industry under the control of local government; therefore, all non-residential waste is classified as commercial. A building or group of buildings consisting of five or more dwelling units is classified as a commercial enterprise and will not be served as a part of the residential solid waste management system. If solid waste management is regulated as a utility, this section would not apply.*

6.11 *Exclusive Service*. All generators of solid waste, other than those operating under permits as authorized in Section 7.01, shall use the services of the local government or contractor for the district in which the solid waste is generated.

COMMENT: *The restriction on the number of contractors servicing a district, coupled with the requirement that all generators, residential or otherwise, use the services of the local government or contractor will allow economical and efficient service.*

Section 7.01 would exempt non-residential waste generators from this requirement as they would provide for their own total solid waste management. In such cases, the applicant would have to meet all the provisions regulating the activity of permit holders and would have to pay such fees as are set for that activity. Renewals, as in all other permits, would be required also.

7. Permits for the Management of Solid Waste

7.01 Permit for the Storage, Transport, Processing, and Disposal of Solid Waste by the Generator thereof. The Director shall prepare application forms for all such permits, requiring the following information:

a. The name and address of the applicant, showing its legal identity (corporation, partnership, association, etc.);
b. The business address of the applicant;
c. The types of waste to be covered by the permit;
d. The methods of storage, transport, processing and disposal;
e. Proof of all insurance required by this ordinance (State financial responsibility limits for motor vehicles, etc);
f. The route or routes to be used in transporting and schedules used;
g. The location and type of processing and/or disposal contemplated;
h. Information as required to indicate compliance with the Occupational Safety and Health, and Environmental Protection Laws of the federal and/or state governments.

COMMENT: *Consideration of safety and the environment are of prime importance. A permittee should be required to indicate what kind of safety measures would be taken in his operations, and how he intends to* *comply with the law. Consideration should be given to the preparation of an Environmental Impact Statement by the agency; the permittee would be required to respond with measures toward mitigating any impacts.*

7.02 Storage Permit. The Director is hereby authorized to prepare application forms for permits for the storage, on premises, of all solid waste generated and retained thereon for more than twenty-four continuous hours. Provided, however, this section shall not apply to a resident of a building of four or less separate dwelling units. Such application shall require:

a. The name and address of the applicant, showing its legal identity (individual, partnership, corporation, etc.); and the business address of the applicant;
b. The classification, anticipated volume and weight of all solid waste to be stored;
c. The location, description and owner of all storage containers and ancillary equipment;
d. Frequency of collection, processing or disposal, showing all permit numbers thereof;
e. All other information reasonably required by the Director to fulfill the intent of this ordinance.

COMMENT: *Effective solid waste management begins at the point of generation. Since the act of producing solid waste cannot be totally controlled, the first element of management to be placed under a permit is storage.*

The 24-hour time limit is arbitrary and may be varied to suit the solid waste management plan of the local government. Such a time limit serves to stimulate the movement of solid waste between the point of storage and further management.

The applicability of this section of 5 or more residences generally is the division between residential and commercial activities. Efficient storage at such facilities would result in the use of bulk containers which must be controlled.

The exemption of normal household waste from a building of four or less dwelling units can be used to prevent the accumulation of waste such as inoperative vehicles and bulky waste on such premises.

As part of the solid waste management plan, the Director will classify the waste by its component parts. The sophistication of classification will depend upon the activity conducted within the locality. Estimated volume and weight are necessary for comprehensive management of all solid waste from the locality.

The requirement of the location of storage containers will allow pre-permit inspection. If exterior locations are involved, sanitation and aesthetics must be evaluated. If interior locations are involved, fire hazards must also be considered. In describing the containers the applicant need only specify the number and type, such as bulk container or plastic bags. Auxiliary equipment, such as compactors, shredders and balers should be listed by manufacturer, model number and the operational plan for each.

The requirements of subsection (d) will enable the Director to evaluate adequacy of present collection practices and to cross-check other activity requiring a permit.

The omnibus provisions of (e) can be utilized to obtain compliance with the health, safety and environmental requirements of the local governing body.

7.03 Permit for Solid Waste Collection. The Director shall prepare application forms for all such permits, requiring the following information:

a. Name and address of the applicant, showing its legal identity (individual, partnership, corporation, etc.);
b. The business address of the applicant;
c. The identity of the non-residential customers using the collection service and all storage permit numbers of same; If residential collection, the area served, hours of collection and type of collection service to be provided;
d. The routes used for the movement of solid waste between collection and further management;
e. An inventory of all motorized equipment to be used in such collection, including all permits required by law;
f. Proof of all insurance required by this ordinance. (State Financial responsibility limits for motor vehicles, etc.);
g. All other information reasonably required by the Director to fulfill the intent of this ordinance.

COMMENT: *This is another step in the permit process of identifying and regulating solid waste management. It would apply where private industry is engaged in collection of solid waste, ranging from a contract operation for an entire city or county downward to a collector who may serve a particular type of industry.*

The type of waste being collected is important since it will enable intelligent regulation by the enforcing arm of the local government. Waste, such as brick, stone and mortar, would need little control, whereas waste from a health care facility or food service establishment would require close regulation to minimize health problems. The *identity of the user of the collection system would allow a crosscheck for observances of other requirements of the law.*

Supplying the Director with the names of customers will allow an evaluation of the scope of the contract and will allow a crosscheck of storage permits. It would be impractical to list all residential users of a collection service but the area served should be described so that maximum efficiency and economy can be obtained through the authority to limit the number of contractors in a given area. Existing contracts would not be affected but could be controlled by permit issuances as contracts expire.

Any contractor will have a plan of operation, including routes, which will enable the Director to see that collection will not interfere with core area traffic and to prevent heavy traffic on residential streets. The type of service would range from curbside bags to taking the filled container to the collection vehicle and returning the empty container to its proper location.

Once a collection vehicle has been filled, the Director should know the route or routes to be used in further management, such as delivery to a transfer station, an incinerator, a recovery station or a disposal site, thereby providing another tool in planning solid waste management, such as alternative routes to provide efficient traffic flow and the location needs for transfer stations.

The equipment inventory will enable the Director to evaluate the ability of the applicant to fulfill his commitments as outlined to this point. Authority under this ordinance does not excuse compliance with state or other licensing laws or permits, such as a public utilities commission.

Insurance requirements are twofold in nature; protection of property and person and protection of the local government. The former is achieved through liability policies, including those on motor vehicles and the latter through performance bonds.

The last subsection could be used to require the applicant to file copies of existing contracts so that overlapping contracts can be eliminated.

7.04 ***Permit to Locate and Operate a Transfer Station.*** The Director is hereby authorized to prepare application forms for permits to locate and operate transfer stations in this locality when applicable, requiring the following information.

a. The name and business address of the applicant;

b. A full legal description of each site, including the name and address of each owner of record. If not owned by the applicant, documentary proof of the right to use each site, with appropriate site plans;

c. Clear evidence of approval by all other regulatory agencies;

d. Operational plan including classification, anticipated volume and weights of solid waste, hours of operation, and resource recovery activity or potential;

e. Applicable permit numbers of persons using each facility;

f. Inventory of all fixed equipment;

g. The method or methods of transporting the solid waste from the transfer station for further management, the destination, route, and identity of the carriers involved;

h. Certificates of all insurance required by this ordinance;

i. All other information reasonably required by the Director to fulfill the intent of this ordinance.

COMMENT: *Generally, two factors determine the use of transfer stations. Volume and distance to the next step of management make it inefficient and uneconomical to use collection vehicles. There may be circumstances peculiar to a locality where a factor or factors other than distance make a transfer station desirable. The need for transfer stations is a matter which will be resolved in the planning stage authorized in Section 6.01.*

The legal description will locate the site. Ownership need not be in the applicant, who may have leased the premise or who may have an option to buy or lease the property. The details of the site plans would depend upon the requirements of other regulatory bodies, which would include approval by a zoning board. As mentioned earlier, the user of this ordinance should look to State statutes for his authority to act. Permit numbers of users can be used by the authorities as a cross-check for full compliance with the ordinance. Fixed equipment, such as a compactor or scales, would be used to evaluate the performance of the unit. Movement from the transfer station may be by truck, barge or railhaul and must have the capacity to assure prompt movement from the transfer station.

If the user wishes to include alteration modification of a transfer station such requirements could be under the omnibus section.

Sanitation, including periodic removal of all solid waste for cleaning the facility, would be set out in the rules and regulations of the enforcement agency.

7.05 Permit to Transport Solid Waste. The Director is hereby authorized to prepare application forms to transport solid waste, originating in this locality, by any method not covered by any other provision of this ordinance, requiring the following information:

a. The name and business address of the applicant (individual, partnership, corporation).

b. The methods of transport, unit volume, schedule of movement routes used and the identity of the persons in the next management step.

c. All other information reasonably required by the Director to fulfill the intent of this ordinance.

COMMENT: *The primary thrust of this section is devoted to the movement of solid waste other than by the collection vehicle. This would include movement from the transfer station, residue for incinerators or nonrecoverable residue from resource recovery activities. When a contract operation is involved a local government may regulate transportation beyond its borders. In a railhaul situation the contract could require the right of way to be kept free of solid waste spillage.*

7.06 Permit to Locate and Operate an Incinerator. The Director is hereby authorized to prepare application forms for permits to locate and operate incinerators or to operate existing incinerators in this locality, requiring the following information:

a. The name and address of the applicant, showing its legal identity (individual, partnership, corporation, etc.);

b. The business address of the applicant;

c. A full legal description of each site, including the name and address of each owner of record. If not owned by the applicant, documentary proof of the right to use the site, with the appropriate site plans;

d. Clear evidence of approval by all other regulatory agencies;

e. Operational plan, including classification, anticipated volume and weight of solid waste to be incinerated, hours of operation, anticipated volume and weight of residue, and resource recovery activity;

f. The method of transporting the residue from the incinerator, the destination and identity of the carriers involved;

g. Certificates of all insurance required by this ordinance;

h. All other information reasonably required by the Director to fulfill the intent of this ordinance.

COMMENT: *Under the definitions in Section 3, this section regulates all solid waste incineration within the locality, including backyard burners and on site activity by businesses, therefore each user must have the prior approval of air pollution control authority before the permit will be issued. The two positive steps authorized are in resource recovery activity and residue disposal.*

The user of this suggested ordinance may wish to include design and performance standards for the incineration process and the handling of waste, including the residue, in all facilities constructed after its effective date. This could also be required in increasing the quality of performance of existing facilities.

7.07 Permit to Locate and Operate a Sanitary Landfill. The Director is hereby authorized to prepare application forms for permits to locate and operate a sanitary landfill in this locality, requiring the following information:

a. The name and address of the applicant, showing its legal identity (individual, partnership, corporation, etc.);

b. The business address of the applicant.

c. A full legal description of each site, including the name and address of each owner of record.If not owned by the applicant, documentary proof of the right to the site, with the site plans which conform to the requirements of this ordinance.

d. Clear evidence of approval by all other regulatory agencies.

e. The engineering design report, prepared by an engineer licensed to practice that profession in this State, including but not limited to the following:

1. Hydrology and climatology
2. Soils and geology
3. Site improvements
4. Volume requirements
5. Control of leaching and gas movement

6. Surface and groundwater protection
7. Completed use
8. Location of residences and structures
9. Access streets, roads and highways

f. Operational plan which shall include, but not be limited to:
1. Hours of operation
2. Classification of waste
3. Anticipated volume and weight of waste
4. Hazardous waste handling
5. Equipment to be utilized
6. Landfilling methods
7. Availability of cover material
8. Anticipated life of the site

g. All other information reasonably required by the Director to fulfill the intent of this ordinance.

COMMENT: *In designing the permit form, the user will have to act within the constraints of applicable State law and the rules and regulations authorized therein. Thorough planning and the application of sound engineering principles to all stages of site selection, design, operation and completed use will result in a successful and efficient sanitary landfill. In order to meet this objective, it is essential that the rules and regulations be comprehensive so that the director can evaluate the applicant's design and operation plans.*

7.08 Permit to Locate and Operate a Resource Recovery Facility. The Director is hereby authorized to prepare application forms for permits to locate and operate facilities to recover material or energy resources from solid waste within the locality, requiring the following information:

a. The name and business of the applicant;
b. Clear evidence of approval by all other regulatory agencies;
c. A full legal description of each site, including the owner of record or, if non-owned, documentary proof of the right to each site, with appropriate site plans;
d. An operational plan, including the classification, volume and weight of solid waste to be delivered, the materials to be recovered, anticipated volume and weight of nonrecoverable residue and hours of operation;
e. The method of transporting the residue from the recovery facility, the destination and identity of the carriers involved;
f. Certificates of all insurance required by this ordinance;
g. All other information reasonably required by the Director to fulfill the intent of this ordinance.

COMMENT: *The need to preserve natural resources has been apparent for some time and has resulted in the passage of the Resource Recovery Act of 1970 (P.L. 91-512). This section is another step in identifying solid waste management and is intended to regulate an activity primarily engaged in resource recovery from solid waste. It would not apply to a paperstock dealer, can manufacturer, or similar activities buying recovered resources to be recycled or reused. Nor would it apply to a retail outlet operated by a charity, since the stock there is donated.*

Two points must be kept in mind by the user of this suggested ordinance. The permits which are authorized in Section 7.01 to 7.08 will not excuse requirements of other regulatory bodies within the locality or higher level within the State. All permit provisions here would apply to both public and private activity, therefore those users who want a public activity excluded must do so.

7.09 Permits to Issue. If the application for any permit required herein shows that the applicant will perform the services or operate the facility, or both, for which the permit is sought, in conformity with the laws of this State, locality and the provisions of this ordinance, including all rules and regulations authorized herein, the permit or permits shall issue. If, in the opinion of the Director of the Administrative Department, modifications can be made which will bring the application within the intent and purpose of this ordinance, he shall notify the applicant or applicants, in writing, setting forth the corrections to be made and the time in which such corrections shall be completed.

COMMENT: *In all instances where all legal requirements are met, the Director is obligated to issue the permits for which application is made. If there are corrections which would bring about full compliance then this should* *be brought to the attention of the applicant and a specific time limit set for compliance. The desirable course to follow here would be one which would encourage applicants to upgrade their application to meet the standards set out in the ordinance. The time limit should be realistic. No provision has been made for an extension of the original time period because this could lead to procrastination. No permit should be issued until full compliance has been assured.*

7.10 Permits, Denial. If the applicant fails to make the corrections pursuant to the notice given under Section 7.10 within the time limit specified therein, or, if the application does not clearly show that the applicant will render services or operate the facility without health hazard or adverse effects on the environment, the application shall be denied and the applicant notified, in writing, stating therein the reasons for the denial. Nothing in this section shall prevent any applicant from reapplying after the rejection of his application, provided the requirements of this ordinance are met.

COMMENT: *The intent of the ordinance includes the identity of all solid waste sources and assurance that total management will enhance the environment and protect the health, safety and welfare of the inhabitants, therefore an application which does not assure full compliance with those requirements must be denied, even though it may eliminate a business. Few businesses will refuse to meet any reasonable requirement and will be in a position to find other successful applicants for temporary waste management.*

7.11 Permit Number, Display. All motor vehicles operating under any permit required by this ordinance shall display the permit number or numbers on each side, in colors which contrast with that of the vehicle, such numbers to be clearly legible and not less than 12 inches high.

COMMENT: *This section will enable the enforcement agency to check on all motor vehicles used in solid waste management as a means of enforcing permit requirements and to prevent the unauthorized use of permit numbers.*

8. Powers and Duties of the Enforcement Agency

8.01 Rules and Regulations. The enforcement agency shall adopt, revise, revoke and enforce rules and regulations governing the health, safety, welfare and environmental aspects of solid waste management within this locality. These rules and regulations must be compatible with state law and applicable state rules and regulations.

COMMENT: *The success of effective solid waste management will depend upon the rules and regulations authorized here. The intent is to allow flexibility in drafting rules by the enforcement agency rather than having legislative action for this purpose. It is anticipated that some users of this suggested ordinance will also be areas where waste will be managed, but not generated, therefore a broad authority is given and includes storage, collection, transport, transfer, processing, recovery, and disposal.*

8.02 Inspections. In order to insure compliance with the laws of this State, the ordinances of this locality and the rules and regulations authorized herein, the Enforcement Agency is authorized to inspect at reasonable times, all phases of solid waste management within this locality.

COMMENT: *As shown in Section 7, permits are issued conditioned upon observance of State and local law, this ordinance and rules and regulations authorized by Sections 6.03 and 8.01. Inspection is the best way to insure compliance with all the above. Conscientious inspection would allow early detection of violations and their correction.*

Amendment IV, United States Constitution provides: "The right of the people to be secure in their persons, houses, papers and effects against unreasonable search and seizures, shall not be violated, but no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the person or thing to be seized." All State Constitutions have the same provision in some form. In the event of a refusal of entry, a search warrant will be the source of entry.

8.03 Notices. In all instances where such inspections reveal violations of this ordinance, the rules and regulations governing solid waste management, or the laws of this State, the Enforcement Agency shall issue written notice for each such violation, stating therein the violation or violations found, the date and time of such violation and the corrective measures to be taken, together with the time in which such corrections shall be made. All such notices shall be kept in a clearly marked file and shall be available for public inspection during regular business hours.

COMMENT: *This section is limited to violations found as the result of inspections and will not apply to any littering violations; the latter would fall into the class of law which is generally enforced by the uniformed police.*

8.04 Citations. In all notices involving permit holders where the corrective measures have not been taken within the time specified, the Enforcement Agency shall cite the violator to appear before the Director of the Administrative Department provided, however, in those cases where an extension of time will permit correction and where there is no public health hazard created by the delay, one extension of time, not to exceed the original period, may be given.

In all instances other than Section 12.01 where the inspections authorized in Section 8.02 reveal violations of the laws of this State, the ordinances of this locality, the rules and regulations in Section 8.01 or when the Enforcement Agency is aware of any such violation, the violator shall be cited to appear in the _______________ Court at a day and time shown in the citation.

COMMENT: *This provides a dual enforcement tool. The rules and regulations authorized to the Administrative Department governing permit holders are primarily to ensure economical and efficient solid waste management. Such violations can be handled through appearances before the Director of the Administrative Department. Other provisions established by State law, ordinance, or rules and regulations are designed to protect the safety, health, welfare, and the environment should carry a heavier penalty for violations. A violator of a rule involving a permit holder would be penalized by a suspension of a permit, or by a revocation. A person operating a disposal facility contrary to the ordinance would be cited to a formal court, where the sentence could be both penal and pecuniary. In the case of a defective reusable container (Section 12.01) the only penalty is the loss of the unacceptable container.*

The surrounding circumstances will include the nature of the violation, its duration and whether it was intentional or inadvertant. All these must be considered by the Commissioner in deciding what action to take.

Due process requires that the permittee receives a detailed list of the alleged violations. After receiving the list, the permittee may decide whether to appeal, correct the violations, or do nothing.

The notice, by including the corrections necessary to avoid permit revocation gives the permittee the opportunity to correct the violations. Ten days is a suggested time, and is reasonable for the alleged violator to decide if he wants to appeal, and if he so decides, to do so.

With the notice, the permittee knows exactly what the alleged violations are and what must be done to correct them. The permittee can then make an intelligent decision as to whether he feels the citation is correct, and thus the permittee will make the corrections; or whether he feels the citation is incorrect, and he will appeal the decision by first requesting a hearing.

Reasonable time will depend on the nature, extent and number of violations. The time must be sufficient to allow the permittee to decide whether to correct the violations or to appeal. If the violations are extensive, the Enforcement Agency may extend the deadline for correcting the violations if the permittee has commenced the corrections, continues to process satisfactorily, and the Enforcement Agency is satisfied that the permittee is acting in good faith, and no health hazard is present, and will complete the corrections as soon as possible.

If the time limit elapses, and the permittee has not filed a request for a hearing or corrected the violations (or at least begun corrections and received an extension from the Director) then the permit is automatically revoked. Since the permittee did not request a hearing within provided, he has waived his rights. Thus the revocation is final, and the only possible recourse left to the permittee is the courts.

After the revocation of the permit, the ex-permittee is liable for the penalties. The revocation and penalty provisions of this ordinance are not mutually exclusive. The Director has the option of invoking either or both provisions.

8.04.1 Hearings. The Enforcement Agency shall appear, through its authorized personnel, and present its evidence, through the Chief Legal Officer, of the violations charged. The permit holder cited may appear in person or through his attorney and may cross-examine the Enforcement Agency witnesses prior to presenting evidence on his behalf.

COMMENT: *This is a simplified procedural matter in which the Enforcement Agency is required to bring its evidence in support of the charge set forth in the notice. This will allow the cited permit holder an opportunity to cross-examine prior to presenting his evidence. The usual administrative hearing will follow judicial procedures but will be on a less formal basis.*

8.04.2 Opinion. The Director of the Administrative Department shall decide the issue and shall, within ______ days of the conclusion of the hearing, render an opinion in writing, in which opinion he may suspend or revoke the permit or permits involved in the hearing.

COMMENT: *A realistic time limit should be set, so that the appeal can be considered prior to the decision. A long time interval should be avoided as it would encourage procrastination.*

8.05 Injunction. In all cases where the violation of this ordinance or the rules and regulations authorized herein, or the laws of this State create an immediate threat to the safety, health, welfare or environment of the residents of this locality, the Enforcement Agency shall cite the violator, stating therein the necessary corrective measures to be taken, and shall order same to begin forthwith. If such corrective measures are not taken forth, the Enforcement Agency shall notify the Chief Legal Officer of this locality who shall immediately apply to the __________ Court for an injunction prohibiting further violation as shown in the notice authorized in Section 8.03. The provision of this section shall be in addition to and not in substitution of any other section or sections.

COMMENT: *This is intended as an added safeguard where action or inaction may create an immediate threat to the safety, health, welfare, or environment of the population. An injunction may be obtained to compel action where corrections are not undertaken immediately. This section would not preclude citation to a court where penal and/or pecuniary penalties could be assessed.*

9. Solid Waste Management Advisory Board

9.01 Appointment. The majority of the Legislative Body of the locality shall appoint ________ residents of this municipality to a board, to be known as the Solid Waste Management Advisory Board, and shall fill all vacancies, however created. Any such appointee shall serve out the unexpired term of the person who is replaced.

COMMENT: *The use of an odd number is desirable to avoid a tie in voting. The ideal board would be made up of a combination of professional and lay people, drawing upon such professions as medicine, engineering, planning and law. Lay members could come from industry, solid waste management, etc. Both the Director of the Administrative Department and the Commissioner of the Enforcement Agency could be made members without voting rights. All appointments could be by the Chief Executive with the consent of the Legislative Body.*

9.02 Terms. The Solid Waste Management Advisory Board shall serve for a term of four years, provided, however, in the initial term, the first _____ named shall serve for two years, the next _____ named shall serve for three years and the last _____ named shall serve for four years.

COMMENT: *The term should correspond with the term of the appointing body or person where possible. In the latter case, the ordinance could authorize the executive to appoint members, with the consent of the Legislative Body. Staggered initial terms will avoid a too cooperative board. In a nine man board, the first two would serve two years, the next three named would serve for three years and the last four named would serve four years. All terms illustrated are initial.*

9.03 Organization – Meetings. The Advisory Board shall, within thirty days after its full appointment, hold a meeting at which it shall elect its officers and adopt by-laws governing the conduct of its business. The Board shall meet not less than one time in each quarter year. The Chief Executive or a majority of the Legislative Body or a quorum of the board may call an emergency meeting at any time.

COMMENT: *Once all members of the Advisory Board have been appointed there is a mandatory thirty-day period in which to hold the first meeting. By-laws are important in that they spell out such terms as a quorum,* *emergency meeting, etc. Added emergency meetings are provided for on the initiative of the Chief Executive, or a majority of the Legislative Body, or a quorum of the Advisory Board.*

9.04 Duties. The Advisory Board:

a. shall advise the Director in the preparation of the solid waste management plan, including the selection of solid waste management sites within this locality.

b. may review permit application forms and recommend revisions thereof, which shall be consistent with the terms of this ordinance.

c. shall attend all hearings called under this ordinance for the adoption, revision or revocation of rules and regulations authorized herein. It may make such recommendations to the Director as are authorized by its by-laws.

d. shall attend all public hearings called by the Director for establishing or altering rates, charges or fees required by this ordinance. It may make such recommendations to the Director as are authorized by its by-laws.

e. may attend any hearings held by the Director regarding complaints arising from the administration of this ordinance. The Advisory Board may make recommendations to the Director which, in its opinion, would alleviate the cause of such complaints.

In all such hearings, the Advisory Board shall participate through the Director only and all recommendations shall be in writing.

COMMENT: *The Advisory Board is designed to do just what the title implies. It is as valuable as it is permitted to be and should represent a cross section of the locality which it serves. No provision has been made for compensation so that anyone using the sample would be free to set out their own schedule. Usually, a board of this type will get either a nominal salary for each day served or the members will be paid all actual expenses incurred and paid.*

10. Time and Frequency of Collection

10.01 Residential. All residential solid waste shall be collected _____ times each week. No less than _____ hours shall lapse between each such collection. All collections shall be made between _____ a.m. and _____ p.m.

COMMENT: *Population density, waste generation and season will determine the frequency of collection. Dense population and heavy waste generation require frequent collection. Summer months may produce added waste in grass clippings, fruit and vegetable wastes, etc. This section could require two collections per week. Minimum collection frequency of twice within 7 days is recognized as disrupting the common house fly life cycle. The time of collection is designed to prevent noise or other annoyances at times when the majority of the population will be resting.*

10.02 Non-Residential. All non-residential solid waste shall be collected at sufficient intervals to protect the environment as set forth in the rules and regulations authorized herein. All such collections shall be scheduled so that collection vehicles do not interfere with rush-hour traffic.

COMMENT: *The variety of non-residential waste prevents detailed regulation as to frequency of collection. Environmental hazards would be the main concern here. Organic wastes subject to decomposition and vector attraction should be removed daily. Other wastes, such as paper from office buildings, need not be collected that often. All business area collections should be set, and efficiency and economy would dictate setting them, at times other than the morning and evening rush hours.*

11. Storage

11.01 Residential. The owners of all residential units shall provide approved containers with sufficient volume to store all residential solid waste generated in each such unit between collections. All residential solid waste shall be securely stored in an approved container, except as herein below provided.

COMMENT: *This provision fixes responsibility for providing an adequate number of containers with sufficient volume for residential waste storage.*

"Approved containers" are left open for definition by rules and regulations. Such containers could be of the conventional size, rustproof, and durable material, with two handles to facilitate emptying, etc., and should include durable plastic or paper bags. Bags are particularly valuable during the summer months. "Securely" would require tight closure at all times other than when placing waste in or emptying waste from a container.

11.02 Non-Residential. All occupants of non-residential premises shall provide a sufficient number of approved containers for the storage of solid waste which they generate and shall place all such solid waste therein, other than those wastes which do not require containerized storage which shall be stored as authorized by the rules and regulations authorized in Section 8.

COMMENT: *In regulating containers for non-residential solid waste, care must be taken to avoid requiring storage of wastes which can be stored in the open. These two sections illustrate methods of fixing responsibility to provide approved containers for storage prior to collection and leave to the one responsible therefore, such as purchase or lease.*

12. Containers

12.01 Sanitation. The owners of all reusable approved containers shall maintain them and the adjacent area in a nuisance and odor free condition.

COMMENT: *The ordinance requires the use of approved containers for all wastes requiring such storage. Routine housekeeping should result in clean containers used for storage of solid waste. This section would be available as an enforcement tool for those few who will be careless in their housekeeping and also to institute effective insect and rodent control procedures.*

12.02 Defective Containers. All reusable containers incapable of meeting the definition of approved containers shall be considered waste and shall be placed in the collection vehicle by the collectors.

COMMENT: *Many localities have tried a tag method of control of container condition with little success. The usual way is to use a warning tag, which is attached to the container. If the container is reused, then a red tag is attached, informing the homeowner that it is illegal to use the container at any time after the tag date. The system here simplifies the entire process and is intended to safeguard the collection crew. This is a type of action which must be properly used in order to maintain resident cooperation.*

12.03 Residential Container Location Prior to Collection. All residential solid waste containers shall be placed at the curb (or alley) not more than _____ hours before collection. All reusable containers shall be removed from the curb (or alley) _____ hours after collection.

COMMENT: *This section serves two purposes. It requires set-out by the homeowner and also serves to regulate placement of full containers and the removal of empties within a reasonable time so that full containers will be less likely to be upset by animals or vandals and empty containers will be removed promptly by the residents, thereby eliminating an unsightly row of cans before each house.*

Set-out and removal by the resident is the most economical process. The availability of funds and distance to the collection point would determine the use of this system. If used, some consideration must be given the handicapped and elderly. Some cities will provide a set-out service for that category. Others may leave it to each individual to make his own arrangement. If bulk containers are in use there may be a need for some variation, particularly where the collection truck enters the property for pick up.

13. Non-Containerized Waste

Non-bulky wastes which do not provide food or harborage for insects and rodents may be placed at the curb for collection provided they are secured to prevent littering and do not exceed _____ lbs. in weight.

COMMENT: *This Section is sufficiently broad to include such items as newspapers, magazines, treelimbs, etc. Size would be within limits set by collection trucks. Weight limits should be set so that the collection crew will not be injured in lifting the bundles. Rules and regulations could be used for added detail, if needed.*

14. Bulky Waste

All bulky items shall be stored within the residence of the owner. The Director shall be notified by each resident of the type and location of items of bulky wastes to be collected and shall make same available for pick-up on the date schedules by the Director.

COMMENT: *The usualy bulky items will include "white goods", that is, refrigerators, washers, dryers, etc., and would include furniture, televisions and hot water tanks. "Available for pick-up" would be determined by the community and could include carry-out from within the residence. The requirement of storage within the residence would keep bulky items out of sight.*

15. Dead Animals

Any resident who has, or finds, a dead animal on his premises shall promptly notify the Director of its location and type and shall make such remains immediately available for collection as provided in Section 6.06.

COMMENT: *The purpose here is to prevent the use of the normal collection service for the dispostion of dead animals, primarily for sanitation purposes. Rules and regulations could be used to provide for storage prior to pick up. Enclosure in a plastic bag would be an example of such a requirement. Needless to say, pick up should be made as soon as possible after notice is received from the resident by the Director.*

The street department would remove dead animals from the streets.

16. Collection – Residential

All residential solid waste shall be collected by the locality or the collector under contract with the locality.

COMMENT: *This section is for use in local collection as no other section covers residential collection other than the permit requirements for a generator who will dispose of his own waste.*

If private contractors are used then the contract between the locality and the contractor would set out in detail the duties and rights of the parties. In such case, the permit sections and rate regulation would apply.

17. Fees

17.01 Establishment and Payment. The Director shall establish such fees for residential solid waste collection as are necessary to meet all costs of operating and maintaining the residential solid waste management system. All such fees, including subsequent revisions thereof, shall be paid by the resident or owner of record of the property served, and shall be paid to the order of the applicable agency on a quarterly basis, not more than thirty days after the expiration of each quarter.

COMMENT: *In establishing fees it is essential that accurate cost figures be used. Of these figures, labor and equipment will represent the greater percentage, with overhead such as office space, supervisory salaries, vacation and sick pay and retirement benefits being representative of the balance. The quarterly billing system is used as it follows most water supply and waste water billing procedures. These fees could be added to those already in force.*

The fees could be paid into the general fund or into a specific account limited to solid waste management.

If general tax funds are the source of revenue for solid waste management, this section should be eliminated.

17.02 Delinquency. All unpaid fees shall become deliquent upon the expiration of the time specified in Section 17.01 and shall bear interest at _____% per annum until paid.

COMMENT: *This is a step in the process of forced collection fees for solid waste management. The fees are deemed delinquent after the expiration of the thirty day period given in the preceding section and collection is required in the subsequent action.*

The provision for interest is intended to bring to the attention of the delinquent account the fact that late payment adds to the cost of his individual solid waste management and to encourage prompt payment. Current lawful interest rates could be used as a guide here and, in no case, should the legal rate be exceeded.

17.03 Collection. The Director shall notify the Chief Legal Officer of all delinquent accounts not more than _____ days after the end of each quarter and the Chief Legal Officer shall take the necessary action tocollect same. Each delinquent account shall be liable to the governing body for court costs and all cost items involved in its collection.

COMMENT: *This section would allow some time for out of court collection activities within the time limit set here. Section 17.01 creates a delinquency 30 days after the expiration of a quarter, thereby automatically limiting the time for suit. An additional thirty day period would not be too long to allow the Director to prepare his delinquency list. Present terminology places a mandatory duty upon the Chief Legal Officer to collect.*

This provision is the only one in the sample relative to delinquency of payments. Health considerations make it mandatory that solid waste management be continued even though user fees are not paid. Added provisions could be considered, including forced sale of real or personal property.

Welfare payments may have to be adjusted to include these fees.

17.04 Uncollected. All uncollected fees, after judgement, shall be placed on record in the locality where the property served is located, as any other judgement lien, and shall be released as paid.

COMMENT: *Property owners, as a rule, are a stable and reliable group. They, in turn, can protect themselves by adding the cost of solid waste management to the rental charge to their tenants.*

There is usually a debt limitation imposed on local governmental units which prevents the use of tax fund unless the debt limit has not been reached. The use of a fee will prevent restrictions imposed by the debt ceiling.

There will be instances where a judgement may be obtained and collection may be delayed or it may be impossible. By recording the judgement the possibility of payment will be increased.

17.05 Increase. No fees authorized in this ordinance shall be increased until the Director has held one public hearing thereon. No hearing shall be held before one notice thereof has been published in a newspaper of general circulation within this locality. There shall be not less than _____ days normore than _____ days lapse between such publication and hearing.

COMMENT: *As presently states, no hearing would berequired in the event that a decrease in fees would be possible.*

A notice is required to advise the users of the system and permit holders that a rate increase is proposed so that any interested person can appear and be heard. The time interval between publication and hearing should be of sufficient duration to allow full participation.

A wide publication of the proposed rate change is desirable. Added media coverage could be used to assure a fully informed public.

17.06 Hearings. The Director shall preside at all hearings concerning fee increases and shall open and close the hearing. Any system user or permit holder present and wishing to be heard shall be recognized by the Director, who shall give the user or permit holder the opportunity to make a consise statement presenting his views.

COMMENT: *This section is intended to provide some order to the hearing by authorizing the Director to open and close the session. He would also be authorized to recognize those who wish to be heard and to regulate the time allocated for a concise statement.*

18. Insurance

18.01 Performance Bonds. All persons who contract with this governing body to manage solid waste shall furnish performance bonds conditioned upon the faithful performance of their agreements. All such bonds shall be written by an insurance company licensed to transact business in this State and shall be for a sum of not less than one half of the annual sum paid to each such contractor. No such bond shall exceed 100% of the annual contract payment to each contractor. Each performance bond shall be for a period equal to the initial contract term, or any extension thereof.

> **COMMENT**: *Performance bonds are usually required by State law to protect the governing body in the event a contractor defaults. Each performance bond will have a time limit set out in which a claim must be reported to the company. Failure to notify the company in that time will void the policy. All insurance policies should be reviewed periodically so that the rights of the locality can be protected.*
>
> *This section could be expanded to require a performance bond of all permit holders who discontinue their activities before the expiration date of the permit, thereby assuring continuance of the activities covered thereby.*

18.02 Payment Bonds. Each contractor referred to above shall, not less than ten (10) days after the execution of each contract, deliver to the governing body proof of a payment bond executed by a surety company licensed to transact business in this State, guaranteeing payment of wages to all employees of the contractor and the cost of all supplies, materials and insurance premiums required in fulfilling each contract.

> **COMMENT**: *This section is intended to safeguard all wages due employees of a contractor, as well as the payment of materials and supplies used in the performance of the contract.*

18.03 Liability Insurance. All contractors and permit holders under the provisions of this ordinance shall furnish proof to the governing body of liability insurance covering all aspects of their activities under this ordinance. No personal injury policy shall be for less than $________ per person or $________ per accident. No property damage policy shall be for less than $________ per accident. All policies required by this ordinance shall have a minimum cancellation period of not less than ______ days after receipt in writing of the notice of cancellation by the governing body.

> **COMMENT**: *Care should be exercised in setting policy limit requirements which will protect the general public. State financial responsibility limits for motor vehicles should not be considered as guides as they are regarded as too low. Workmen's Compensation by a private carrier would not be covered by this section as it is now written.*

19. Permit Renewal

Any permit holder desiring to renew an existing permit shall complete and submit to the Director of the Administrative Department an application therefor not more than ______ days nor less than ______ days before the expiration date thereof and shall tender with each application form such permit fees as are herein below required.

> **COMMENT**: *Sufficient time should be allowed to process a renewal application to provide another source for the activity, if the renewal is denied. It will also give the Director time to inspect equipment and sites.*

20. Permit Fees

Each application for a permit, or renewal application, shall be accompanied by a certified check or money order in the following amounts:

a. 7.01 $__________(Self-Management)
b. 7.02 $__________(Storage)
c. 7.03 $__________(Collection)
d. 7.04 $__________(Transfer)
e. 7.05 $__________(Transport)

f. 7.06 $__________(Incineration)
g. 7.07 $__________(Sanitary Landfill)
h. 7.08 $__________(Resource Recovery)
All fees required by this section shall be placed in the ______________ fund of this governmental agency.

COMMENT: *Fees should be realistic and should bear a reasonable relation to the expenses incurred by the governmental agency for processing applications. It may be desirable to provide an added clause making all such fees non-returnable.*

21. Appeals

Any person who feels aggrieved by any action of the Director of the Administrative Department or the Commissioner of the Enforcement Agency may within ______ days of the act for which redress is sought, appeal to the Advisory Board, in writing, setting forth in a concise statement the act being appealed and the ground for its reversal.

The Advisory Board shall, within ______ days following the receipt of each written appeal schedule a hearing date and notify the appellant and the Director of the Administrative Department or Commissioner of the Enforcement Agency in writing of the date and time of the scheduled hearing. The appellant may appear on his own behalf, or through counsel, and may present his witnesses. The Director of the Administrative Department or Commissioner of the Enforcement Agency may present rebuttal testimony and witnesses.

The Advisory Board shall within ______ days after the hearing notify the Director of the Administrative Department or Commissioner of the Enforcement Group of its decision and recommendations and shall forward one copy to the appellant.

The Director of the Administrative Department or Commissioner of the Enforcement Agency shall within ______ days of the receipt of the decision of the Advisory Board, either approve or disapprove the decision and recommendation of the Advisory Board and shall forward a copy to the appellant.

COMMENT: *Appeals to an Advisory Board should be encouraged as this could help relieve congested courts of their case loads and provide for rapid resolution of the question. It should be emphasized, however, that any decision of the Board is binding upon the governmental agency. In the proceeding, the Administrative Department makes the final decision. Disadvantages of such appeals are the absence of power of a board to compel the attendnace of witnesses or the production of evidence.*

22. Appeals, Alternative

Any person who feels aggrieved by any act of the Administrative Department or Enforcement Agency may waive the provision of Section 21, and within the time limit specified therein, appeal directly to the Court of __________.

During all appeals authorized herein, the opinion of the Director shall remain in full force and effect.

COMMENT: *The Administrative Procedures Act of the State should be consulted and followed for the details of appeals procedures, including time restraints. Each State will have a court of broad initial jurisdiction which should be authorized to hear appeals from administrative action.*

23. Computation of Time

The time within which an act is required by law to be done shall be computed by excluding the first and including the last day; except that when the last day falls on Sunday or a legal holiday, then the Act may be done on the next succeeding day which is not Sunday or a legal holiday.

When a public office in which an act, required by law, is to be performed is closed to the public for the entire day which constitutes the last day for doing such act, or before its usual closing time on such day, then such act may be performed on the next succeeding day which is not a Sunday or a legal holiday.

COMMENT: *This section will set a standard for actual time intervals as all notices to correct deficiencies will have to carry a definite time limit. Other provisions, as in permit applications require a definite time period for action.*

24. Title to Waste

In the absence of an agreement to the contrary, title to the solid waste shall vest in the owner of each management activity or facility in which the solid waste is placed.

COMMENT: *This section is intended to pass title to waste from the generator to an identifiable person throughout its management. This will help fix responsibility for management and will avoid confusion as to ownership of recovered items. It will also avoid conflicting claims in the event a resident inadvertently includes an item of value in his waste, as such item would be neither unwanted, discarded or useless. Resource recovery will give added emphasis to the need for legal title to solid waste, particularly where large volumes are involved, therefore this section clearly fixes ownership at any management step.*

25. Prohibited Activities

25.01 Dead Animals. It shall be unlawful to place any dead animal, or parts thereof, in a container for collection without the consent of the Director, provided, however, this section shall not apply to animal parts from food preparation for human consumption.

COMMENT: *This section is to encourage the use of the dead animal collection required in Sections 6.06 and 15. The exclusion includes all food preparation, including residential and commercial activity, such as restaurants.*

25.02 Littering. It shall be unlawful to place, or allow to be placed, any solid waste upon the roads, streets, public or private property within this municipality contrary to the provisions of this ordinance.

COMMENT: *Proper solid waste management requires regulated disposal. This section and Section 25.08, prohibiting dumps, are intended to eliminate litter and promiscuous dumping. The penalties provided in Section 26 can be used to discourage either practice. "Allow" is included for the protection of a property owner whose consent is not given to a person dumping or littering.*

25.03 Acts Contrary to Ordinance. It shall be unlawful to store, collect, transport, transfer, recover, incinerate, or dispose of any solid waste within the boundaries of this locality contrary to the provisions of this ordinance.

COMMENT: *This Section declares all aspects of solid waste management illegal unless done in conformity with the provisions of the ordinance. Any person who stores, collects, transports, transfers, recovers, incinerates, or disposes of solid waste must have the required permits and must conform to State and local laws and the rules and regulations authorized in this ordinance. Although residential solid waste has minimal regulation here, legislative bodies may want to go into greater detail.*

In the event that a process or activity for solid waste management is introduced in the locality, the user will have to set up a permit application and include it in this and other applicable sections.

25.04 Vehicle Construction. It shall be unlawful to transport any solid waste in any vehicle which permits the contents to blow, sift, leak or fall therefrom.

COMMENT: *This is the only provision which sets standards for vehicle construction and is a requirement usually found in State laws.*

25.05 No Interference withAuthorizedSolid Waste Management. It shall be unlawful for any person to interfere with any employee of this locality or any employee of a contractor while in the performance of their duties as authorized by this ordinance.

COMMENT: *Inspections before and after issuance of permit are necessary to insure compliance with the ordinance. This Section is the basis for penalizing interference with any person acting under the authority of the ordinance.*

25.06 Scavenging Prohibited. It shall be unlawful for any person to scavenge any solid waste within the boundaries of this locality.

COMMENT: *Solid waste management cannot be effective if casual pickers are permitted in any step in the process, whether pre-collection activity from containers at the curb or at an incinerator or sanitary landfill. Controlled recovery should be encouraged at any logical step of proper solid waste management.*

25.07 False Information. It shall be unlawful for any person to make any false statement in any application required by this ordinance.

COMMENT: *This section provides a penalty for false information given on any application required by the ordinance. Conviction would require a showing that the false information was provided deliberately but would not include innocent or erroneous information. The Administrative Department would also have the inherent right to revoke any permit or permits involved in the applications, as a false statement vitiates such matters.*

25.08 Dumps Prohibited. It shall be unlawful for any person to use or operate a dump.

COMMENT: *The intent of the ordinance is set forth in Section 2 and will be defeated unless all dumps are converted to sanitary landfills or are eliminated.*

25.09 Burning Prohibited. It shall be unlawful for any person to burn solid waste in any manner other than in a duly authorized incinerator.

COMMENT: *Air pollution control can not be effective unless open burning is eliminated. The ordinance requires a permit for all incinerators, thereby insuring the installation and use of pollution control measures, including the disposal of incinerator residue and proper treatment of quench waters. The ban here would include leaf burning, therefore the added waste volume will have to be considered in the plan requirements of Section 6.01. This section does not prohibit the use of a fireplace or outdoor grill of residences, unless barred by a separate law.*

25.10 Animal Feeding. It shall be unlawful for any person to engage in the feeding of food waste to animals for commercial purposes.

COMMENT: *State law usually regulates food waste (garbage) feeding to animals, usually swine, under controlled conditions. If such feeding is permitted, those regulations shall be followed.*

25.11 Illegal Use of Permit Number. It shall be unlawful to display any permit number unless the person displaying such number or numbers holds a valid permit or permits therefor.

COMMENT: *A duly issued permit may be suspended or revoked by the Director of the Administrative Department. This Section would make it illegal either to use a fictitious permit number or to continue the display of permit number after suspension or revocation. Permit numbers are needed to identify and regulate solid waste management.*

25.12 Hazardous Waste. No person shall place any hazardous waste in any container for collection, transport, processing or disposal until the Enforcement Agency has approved the method of storage, transport, processing, or disposal.

COMMENT: *This section is intended to identify and regulate hazardous waste to protect the health of the community and to protect people engaged in solid waste management. Experience will allow some standardization in proper management of hazardous wastes.*

26. Penalties

Any person convicted of a violation of this ordinance, or the rules and regulations authorized herein, shall be subject to a fine of not more than $______ or imprisonment in the county jail for not more than ______ months, or both.

COMMENT: *The Court enforcing an ordinance will have limits in pecuniary and penal punishment, therefore that limitation must be considered in setting forth sums and sentences. Penal institutions may be a county jail, a municipal jail or a workhouse. The maximum range should be high enough to discourage violation and a penalty section should allow some discretion to the judge.*

27. Repealer

The following ordinances of this locality are hereby repealed: ________________________________.

COMMENT: *All ordinances which are to be replaced by this ordinance should be specifically listed, based upon careful evaluation of each to be repealed. The use of an omnibus repealer should be avoided as it may prove too broad.*

28. Savings Clause

Nothing in this ordinance shall be deemed to affect, modify, amend or repeal any provisions of an ordinance administered by the Administrative Department or Enforcement Agency or any other department, board, commission or agency of this locality.

COMMENT: *If no existing ordinances are to be repealed and if the Solid Waste Management Ordinance is not to affect any existing ordinances or authority created by existing ordinances, the above provision would be useful in showing such intent.*

29. Severability Clause

The provisions of this ordinance are severable, and if any provision or part thereof shall be held invalid or unconstitutional or inapplicable to any person or circumstance, such invalidity, unconstitutionalty or inapplicability shall not affect or impair the remaining provisions of this ordinance.

COMMENT: *If a court strikes out a part of the ordinance prompt legislative action should be taken to enact provisions to fill the void.*

30. Effective Date

This Act is hereby declared an emergency provision to protect the health and welfare of the inhabitants of this locality and shall take effect immediately upon its passage, provided, however, those sections requiring permits shall not apply to existing facilities for a period of ______ months after said effective date.

COMMENT: *In establishing an effective date for the ordinance sufficient time must be given so that existing facilities can be brought within the terms set forth. Dumps could be closed in a short time but would require a longer period for conversion to a sanitary landfill.*

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